

HORTICULTURAL ABSTRACTS

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MISCELLANEOUS.

General.

- JACOB, A. 631.634(47)
Neuere Arbeiten der russischen Landwirtschaftschemie, (Recent work of Russian agricultural chemists.)
Forschungsdienst, 1942, 14: 69-82, bibl. 58.
A brief outline is given of the aims and results achieved by Russian investigators into agricultural problems in recent years. Among problems discussed are, first and foremost, soil science, in which Russian scientists have led the world. Others include manuring, especially phosphatic in the absence of superphosphate, potassic manuring and the use of by-products for the supply of necessary minor elements. The effects of the exact times of application of the different fertilizers to particular crops and the effects of fertilizers and manures on cold resistance have also received attention. The rubber plant, *kok saghyz*, has been thoroughly investigated. Progress has been made in partial sterilization of the soil by chloropicrin. Other problems noted here, on which work has been done, are vernalization, the work of the nitrifying bacteria and quick germination tests.
- MCTAGGART, A. 581.6
Plant introduction. 1. A review, with notes on outstanding species.
Pamphl. Coun. sci. industr. Res. Aust. 114, 1942, pp. 14.
Except for pyrethrum, the most valuable strain of which so far comes from Yokohama, the other introductions mentioned here are grasses, cereals or legumes. The three main stations for systematically testing the plants introduced are (1) Canberra, A.C.T. for "mediterranean" climate and lower rainfall material; (2) Lawes (Gatton), S. Queensland, for sub-tropical plants and (3) Fitzroyvale, Rockhampton, Central Queensland, for the more tropical plants.

Growth phenomena.

- [WHITE, P. R.] 581.14
The growth of plants.
Science, 1942, 96, No. 2488, Suppl., pp. 10-11.
Growth studies by means of plant tissue cultures are noted. The tissues used were detached root pieces of tomato and

other plants, abnormal tumour-like growths of tobacco, and crown gall on sunflower. For growth to continue without check 11 mineral salts containing 16 elements, a supply of carbohydrate, 3 vitamins and 1 amino acid were necessary. Omission of magnesium, calcium or sugar caused immediate growth stoppage. In the presence of a liberal oxygen supply the tumour-like growths would proliferate in all directions, but should oxygen be reduced, as when portions of the material sink below the nutrient fluid, development of stems and leaves would begin. Brought up to air again the original formless condition would reassert itself. [Substance of a lecture delivered to the Society for the Study of Growth by Dr. White, Rockefeller Institute for Medical Research, Princeton, N.J.]

- [BURR, H. S.] 631.588.1:581.14
[Electrical discharge and plant growth.]
Science, 1942, 96, No. 2486, Suppl., p. 10.
Mention is made of Professor Burr's experiments which show for the first time that electrical discharges of growing plants vary in intensity with changes in the rate of growth and with internal structural developments. Voltages as measured were from 25 to 75 thousandths of a volt and some of the changes detected were quite abrupt. The more rapid fluctuations in plants accompanying internal changes are said to be "curiously like brain waves in animals". The paper appeared in a recent issue of the *Yale Journal of Biology and Medicine* (exact date not given).
- LUNDEGÅRDH H. 581.144.2:631.437
Electrochemical relations between the root system and the soil.
Soil Sci., 1942, 54: 177-89, bibl. 11.
A method is described by means of which the potential differences between the soil and the root system of plants can be determined.
- WATSON, R. W. 576.32
The mechanism of elongation in palisade cells.
New Phytol., 1942, 41: 206-21, bibl. 34.
The indication of experiments so far completed and fully described in the paper seems to be that in the case of the

sun leaves of English ivy the uppermost cells of the mesophyll become more or less desiccated through cuticular transpiration, and as a result the starch-sugar ratio shifts, bringing about a greater concentration of osmotically active substances in the vacuoles. This in turn causes the increased vacuolation responsible for the expansion of the [palisade] cells. Light, however, does have a direct influence in the formation of palisade cells but this may be due to an effect on the shape of the cells rather than on their vacuolation. This question is being examined. When grown in shade English ivy produces leaves without palisade tissue of any kind. [From author's summary.]

7. SNOW, M., AND SNOW, R. 581.45/46

The determination of axillary buds.

New Phytol., 1942, 41: 13-22, bibl. 3.

In *Epilobium hirsutum* (Great Willow Herb) and various *Labiatae* the determination of an axillary bud is shown to depend on some influence exerted by the subtending leaf or some part of it; the basal part of the leaf, together with its insertion area, is often enough. When in *E. hirsutum* one of the youngest of the visible pairs of primordia is partially isolated from the stem apex by a vertical cut, its bud is always formed on the isolated piece, if formed at all, and is abnormally large. This point and others are briefly discussed. [From authors' summary.]

8. SNOW, R. 612.014.44:581.14

Torsions and their analysis.

New Phytol., 1942, 41: 1-12, bibl. 9.

The methods by which petioles, flower stalks, dorsiventral stems and other dorsiventral organs orient themselves to light and gravity are analysed with reference to the hypotheses put forward by earlier writers and with the aid of experiments carried out by the author.

9. COMMONER, B., AND MAZIA, D. 577.15.04

The mechanism of auxin action.

Plant Physiol., 1942, 17: 682-5, bibl. 5.

The effect of auxin on cell enlargement may be a consequence of its effect on salt absorption and the water uptake which accompanies such an increase in the sap solute. Auxin stimulates the enlargement of cells by augmenting the intensity of the osmotic driving force. The dependence of cell enlargement on respiratory processes may be viewed as a result of the respiratory dependence of the salt absorption process and the evidence points to the 4-carbon acid metabolism as the respiratory agent particularly related to these phenomena.

10. THIMANN, K. V., SKOOG, F., AND BYER, A. C. 577.15.04

The extraction of auxin from plant tissues II.*

Amer. J. Bot., 1942, 29: 598-606, bibl. 13.

The paper presents further evidence as to the nature of the auxin complex and brings out certain important considerations which will have to be taken into account before a reliable and convenient method for the quantitative extraction of auxin from plant tissues can be achieved. Suggestions for simplified procedure are put forward which will determine the bulk of the total auxin in green plant material with a minimum number of extractions.

11. PRIDHAM, A. M. S. 631.535

Factors in the rooting of cuttings and the growth of young plants.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 579-82, bibl. 2.

Trials at Ithaca with *Ligustrum ovalifolium* and *Rhododendron catawbiense* indicate strongly that rooting of cuttings and subsequent growth of the young plant depend primarily upon the maturity and treatment of the stock plant. Response to treatment with growth substances, sugars and nitrogenous compounds alone or in combination is of secondary magnitude and is much more variable.

12. LONGLEY, L. E. 631.535

Influence of type of cut on rooting of cuttings in certain greenhouse plants.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 578, bibl. 1.

Trials in Minnesota indicate that it is normally of little importance whether cuttings of greenhouse plants are severed at right angles to the stem or in a slanting direction.

13. GUSTAFSON, F. G. 581.163

Parthenocarp: natural and artificial.

Bot. Rev., 1942, 8: 599-654, bibl. 174.

An extensive literature is reviewed. The hypothesis is put forward that some plants under some conditions produce enough growth hormone so that with or without pollination, as the case may be, they are able to prevent the abscission layer from being formed in the pedicel, and in certain favourable circumstances of nutrition and absence of competition they can transport the necessary food and bring about enlargement of the cells of the ovary to produce mature fruits, whereas other plants are unable to do this.

14. ZERLING, V. V. 581.162.3:631.811.9

Influence of major and minor nutrient elements on pollen germination in plants.

C.R. Acad. Sci. U.R.S.S., 1941, 32: 439-42, bibl. 5.

Past and present experiments show that the influence of the different elements on the growth of the green plant differs greatly from that on pollen germination. Thus in the series of cations potassium salts play a very minor role as regards pollen germination though they are extremely important in the life of the green plant. The salts of the micro-elements in general, especially magnesium, are on the other hand very important in this series. As regards anions boron is found to be most important to pollen germination and is followed by chlorine and bromine, all of these being more important than nitrogen. Phosphorus is of particularly little importance to pollen germination. The pollen used in the tests here recorded was from *Nicotiana affinis*, *Galanthus nivalis*, *Primula obconica*, *Lathyrus odoratus*, *Lupinus polyphyllus* and *Cucumis sativus*.

15. ZHDANOVA, L. P.

581.192:581.143.26.03:612.014.44

Plants' content of minor growth substances as affected by vernalization and photoperiodism.

C.R. Acad. Sci. U.R.S.S., 1941, 32: 584-7, bibl. 10.

The conclusion reached by the author as the result of his experiments with both long day plants (barley, mustard) and short day plants (sunflower, perilla, chrysanthemum, hemp and tobacco) is that the content of the minor growth substances (bios components and vitamin C) in plants grows with the intensity of growth processes and is not connected with the transition of the plant to reproductive development.

16. HUNTER, J. G. 632.51:632.19

A chlorosis of bracken due to manganese deficiency.

Nature, 1942, 150: 578-9.

Chlorosis of bracken in Perthshire is shown to be a result of manganese deficiency. The low starch content of the rhizomes of chlorotic plants supports the view usually held that manganese is intimately linked with carbohydrate metabolism. Injury sometimes caused to bracken by heavy liming may be due to physiological disturbance produced by a reduction of the availability of manganese in the soil or by an increase in the calcium content of the plant.

17. ROBBINS, W. J., AND KAVANAGH, V. 577.16:582.8

Vitamin deficiencies of the filamentous fungi.

Bot. Rev., 1942, 8: 411-71, bibl. 147.

The authors have summarized the literature on the relation of vitamins to the growth of fungi. The subject is considered of fundamental importance to a knowledge of

* Part I, *Amer. J. Bot.*, 1940, 27: 951-60; *H.A.*, 11: 333.

vitamins and to a clear understanding of the basic factors concerned in the development of all organisms.

18. CARPENTER, C. C., AND FRIEDLANDER, E. M. 577.16:582.8

Occurrence of vitamins in fungi.

Science, 1942, 95: 625, bibl. 2.

Aspergillus niger and various species of the higher fungi, including the common mushroom *Agaricus campestris*, have been found to produce thiamin (B_1) and riboflavin (B_2) without it being necessary to add mercuric salts or other poisons to the cultures. The authors consider the production of these vitamins to be a normal function of fungi.

19. WESTON, W. A. R. D., AND TAYLOR, R. E. 635.1/7:632.4

Development of penicillium on the cut surfaces of certain vegetables.

Nature, 1943, 151: 54-5.

Penicillium developed copiously on the cut surfaces of a number of root vegetables, including potatoes, within 5 days following a momentary dip in 2½% solution of copper sulphate and on further investigation a similar reaction was found to occur with solutions or suspensions of other copper salts when the concentration was not less than 1%. When a number of other metallic salts were similarly used, *Penicillium* developed early only following treatment with cobalt salt. It developed after a longer interval and to much smaller extent after treatment with nickel, iron and mercury. Untreated surfaces exhibited no fungal growth of any sort. A full account is to be published elsewhere.

20. SCHLENKER, F. S. 581.14:631.8
Availability of adsorbed ions to plants growing in quartz sand substrate.

Soil Sci., 1942, 54: 247-51, bibl. 2.

FLINT, L. H., AND MORELAND, C. F.

612.014.44:581.144.4

A comparison of the effects of green light and of red light on the simple-leaf development of intact and decapitated plants.

Plant Physiol., 1942, 17: 677-81, bibl. 4.

Soils.

21. ANDERSON, M. S., KEYES, M. G., AND CROMER, G. W. 631.416/418:631.45

Soluble material of soils in relation to their classification and general fertility.

Tech. Bull. U.S. Dep. Agric. 813, 1942, pp. 79, bibl. 80, 15 cents.

An account of studies on the comparison of soil solutions variously prepared from representative series of some of the important soil groups and of base exchange relationships of these soils. Coupled with these are data on the relation between soil solutions and plant response to alteration of the water soluble components, after alteration of important soil types has taken place through cultural practice. This last phase is definitely related to the efforts which are made to determine the availability of certain plant nutrients by the use of rapid tests.

22. WILLIAMS, R. F., AND MARSHALL, T. J. 631.432

Determination of the permanent wilting percentage of soils.

J. Aust. Inst. agric. Sci., 1942, 8: 109-11, bibl. 6.

A method for determining the permanent wilting percentage of soils, using sunflower seedlings as indicators, is described and two methods of indirect approach for use when a shorter determination period than 6 weeks is required receive brief mention.

23. COLLINS, E. R., AND SKINNER, J. J. 631.82
Effect of dolomitic limestone on soils and crops when used as a neutralizing agent in complete fertilizers.

J. Amer. Soc. Agron., 1942, 34: 894-901, bibl. 12.

HORNER, C. K., AND OTHERS.

631.461:546.77 + 546.881

Nitrogen fixation by azobacter as influenced by molybdenum and vanadium.

J. agric. Res., 1942, 65: 173-93, bibl. 40.

Experimental technique.

24. HAYWARD, H. E., BLAIR, W. M., AND SKALING, P. E. 581.11:581.144.2

Device for measuring entry of water into roots.

Bot. Gaz., 1942, 104: 152-60, bibl. 10.

A photometric device for the quantitative determination of water movement into roots is described together with some results obtained by its use.

25. WESTER, R. E., AND MAGRUDER, R. 77:581.9
A method of photographing plants in the field.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 380-2.

An inexpensive portable field photographic studio is illustrated and described. It consists essentially of greenhouse sash with covering of sacking or cheesecloth. Its aim is to prevent air movement and regulate the light available.

26. SAPOZHNIKOV, D. I. 581.174
A new method for determining the concentration of chlorophyll.

C.R. Acad. Sci. U.R.S.S., 1941, 32: 369-71, bibl. 1.

The method of determining the concentration of chlorophyll which is here described consists of measuring the width of the band I in the absorption spectrum of chlorophyll by means of a drum spectrometer. The process is described in detail.

27. CARTER, W. 663.61:581.084.1:581.144.2
A method of growing plants in water vapour to facilitate examination of the roots.

Phytopathology, 1942, 32: 623-5.

A method which prevents the mechanical injury and interference with growth resulting from frequent and critical examination of roots of plants grown in various media is described. The plants are set in the perforated top of a wooden box in which is fixed an atomizing device similar to those used to keep vegetables fresh when displayed for sale or in air-conditioning apparatus. In these devices a very fine jet of water impinges on a metal plate resulting in a steady drift of finely divided vapour. A cylinder containing 5 litres of concentrated nutrient solution is included in the system and is refilled every other day. A diagram illustrates the simple method by which the nutrient is passed into the water stream without undue exhaustion. The system does not provide a nutrient of constant concentration but rather one that gradually dilutes. Photographs of the roots *in situ* show them to be exceptionally vigorous.

28. WARNE, L. G. G. 578.088.1
Preservation of plant material.

Nature, 1942, 150: 661, bibl. 1.

Plant material for botanical teaching purposes may be preserved by use of the now well-known Campden domestic fruit preserving tablets, consisting of sodium or potassium metabisulphite, or by a solution of sulphur dioxide. In the case of bulky material the saving of alcohol is very great and this fact well outweighs the slight disadvantages which the method possesses.

29. FRIESEN, G. 578.088.1
Erfahrungen bei der Konservierung mit Celodal.

(Tests of Celodal as a preserving agent.)

Angew. Bot., 1942, 24: 457-61, bibl. 5.

Celodal is a condensation product of urea and formaldehyde. Most of the author's experimental material was zoological. The only botanical substances were the water plants *Utricularia minor* and *Salvinia auriculata* with which he had very little success.

30. PINCKARD, J. A., AND BOZOVAISKY, L. S. 581.084.1
A method for the culture of seedlings and small plants in sunlight under controlled temperature conditions.

Phytopathology, 1942, 32: 467-76.

A refrigerated plant culture chamber is described, designed to meet the needs of small-scale greenhouse research, with accuracy, efficiency and at a low cost. The principle of design is described as the movement of low-velocity air at a stated temperature across surfaces exposed to light radiation.

31. CHOUARD, P. 663.61:581.084.1
Comment pratiquer les nouvelles cultures dans l'eau. (The technique of soilless culture.)
Rev. hort., 1938, 25: 281-96.
Les cultures sans sol. (Soilless culture.)
Rev. hort., 1940, 27: 118-22, 147-51.

BODMAN, G. B. 631.425
Nomograms for rapid calculation of soil density, water content, and total porosity relationships.
J. Amer. Soc. Agron., 1942, 34: 883-93, bibl. 6.

CHEPIL, W. S. 631.459:632.183
Measurement of wind erosiveness of [freshly cultivated] soils by dry sieving procedure.
Sci. Agric., 1942, 23: 154-60, bibl. 2.

CRIST, J. W. 519:634/635
Tetrachoric correlation for horticultural research.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 549-51, bibl. 3.

- HILLARY, B. B. 578.6
Permanent preparations from rapid cytological technics.
Stain Tech., 1938, 13: 161-7, bibl. 6.
MAEKAWA, T. 581.145.1
A device for automatic and periodical registration used in studying movement during flowering. [Japanese.]
J. hort. Ass. Japan, 1941, 12: 79-84, bibl. 5.

Induced polyploidy.

32. THOMAS, P. T. 547.944.6:575.24
The use of drugs in plant improvement.
Gdnrs' Chron., 1942, 112: 238-9.

Discusses the use of colchicine and acenaphthene for bringing about chromosome doubling in plants which it is desired to improve. Polyploid plants so produced are often larger, sturdier and more robust, have larger flowers and fruits and bloom later than the diploids. Examples are given of many other types of improvement. The method of application of these drugs is described.

33. ARMSTRONG, J. M. 635.1:547.944.6
Production and value of polyploid field roots.
Sci. Agric., 1942, 22: 787-98, bibl. 12.

HAWKES, J. G. 547.944.6
Some effects of the drug colchicine on cell division.
J. Genet., 1942, 44: 11-21, bibl. 10.

HOWARD, H. W. 577.15.04
Heteroauxin and the production of tetraploid shoots by the callus method in *Brassica oleracea*.
J. Genet., 1942, 44: 1-9, bibl. 17.

TREE FRUITS, DECIDUOUS.

General.

34. MAGNESS, J. R., AND TRAUB, H. P. 551.5:634.1/8
Climatic adaptation of fruit and nut crops.
Yearb. Agric. U.S. Dep. Agric. 1941, pp. 400-20, bibl. 68.

The climatic conditions, i.e. temperature, moisture, humidity and light, which allow of the successful cultivation of the common fruit crops of the world are here considered. Tropical fruits, which except for mangoes and pineapples in Florida, are not grown in the U.S.A., are discussed briefly, but considerable, well documented information is afforded on the following:—citrus, dates, figs, deciduous fruit trees, grapes, strawberries, raspberries, blackberries, currants, gooseberries, cranberries, blueberries, pecans, walnuts, almonds, filberts, chestnuts.

35. HURD, E. B., AND OTHERS. 634.1/7-1.16
Economic conditions and problems of agriculture in the Yakima Valley, Washington. Part III. Fruitfarming.
Bull. Wash. agric. Exp. Stat. 409, 1941, pp. 97, bibl. 19.

Fruit farms in the Yakima Valley are very specialized, 90% of their irrigated land being under orchard. Costs are high, cash expenses in 1937 varying from about \$180 per acre on apple farms to \$110 on apple-pear-stone fruit farms and total farm operating expenses, including wages to unpaid family labour, depreciation, and cash costs, varying from \$210 on apple to \$125 on apple-pear-stone fruit farms. The average apple farm with 25-50 acres under orchard was able to pay all costs including wages to operator but not interest on investment with a yield of 425 boxes per acre and a net return to the grower [after deducting packing charges] of 40 cents per packed box or with a yield of 265 boxes at 60 cents or 1,100 boxes at 20 cents. Smaller

orchards with their higher cost of labour per acre needed higher yields and it is considered that the average orchard of less than 25 acres is thus very seriously handicapped. Estimates are made of probable trends of prices in the next few years.

36. POTTER, J. M. S. 634.1/7
Fruit from the garden.
Growmore Bull. Minist. Agric., Lond., 7, pp. 13, 3d.

Although it does not admit it this bulletin presupposes a certain amount of very elementary horticultural knowledge coupled with common sense. Given these two assets the owner of a small garden should be able to derive great benefit from this small manual on the production of apples, pears, plums, morello cherries and small fruits other than strawberries.

37. SWARBRICK, T. 634.993
Hedge and tree-stump clearing.
Bull. Minist. Agric., Lond., 101 (4th edit.), 1942, pp. 13, 6d.

The chief methods of hedge and tree stump grubbing falls into 4 groups:—(1) *Hand methods*. These include the use of picks and mattocks and on a larger scale timber jacks and monkey winches, the uses of which are here described. The timber jack is essentially an adaptation of the ordinary motor-car jack and the monkey winch an adaptation of the ordinary windlass. (2) *Power methods*. The use of farm tractors provided with necessary auxiliary appliances is discussed. Any type of steam or motor engine can be used for stump clearing provided it is fitted with the necessary winding gear. Bulldozers, such as are used in the construction of modern aerodromes, will quickly excavate hedges. Gyro-tillers running on caterpillar tracks are ideal machines for hedge and bush clearing. (3) *Use of explosives*. Gelignite is particularly useful. Notes are given on general procedure. (4) *Chemical methods*. So far not very successful.

38. SUGAWARA, T. 634.11:577.16
Vitamin C in apples. [Japanese, German summary.]
J. hort. Ass. Japan, 1941, 12: 109-12, bibl. 13.
Of varieties tested, Winesap, Ben Davis and Northern Spy showed high vitamin C content; Yellow Newtown, Tompkins King and Black Ben Davis medium, and McIntosh Red, White Pippin and Ortley low vitamin C content. Although the same variety may vary in its vitamin C content in different localities it is found that varieties rich in this vitamin will show this character wherever they are growing.
39. WOLF, J. 634.11:577.16
Über den Vitamin-C-Gehalt deutscher Äpfel. (Vitamin content of German apple varieties.)
Gartenbauwissenschaft, 1941, 16: 292-313, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 25.
Some 37 varieties of apple, mainly from Southern Germany, were tested. The vitamin content was determined shortly after picking and after cold storing for a number of months at -0.5 to 2.5°C . At temperatures of 2.5°C . vitamin C losses ranged from 0 to 50%, and at 0.5 from 3 to 30%. Nearly a third of all the varieties contained 20 to 30 mg. per 100 g. [presumably at picking].
40. McGRATH, J. V. 634.13
The Packham's Triumph pear.
Agric. Gaz. N.S.W., 1942, 53: 325-6.
A note of the raising of Packham's Triumph pear from a cross between Uvedale St. Germain (the Bell) and Williams. The raiser was Charles Henry Packham of Molong district. N.S.W. The date is not given but was before 1909.
41. DAVIS, S. G., AND LEVINE, A. S. 634.22-1.56
Composition and utilization of the beach plum.
Fruit Prod. J., 1942, 21: 361-4, bibl. 6.
The beach plum (*Prunus maritima*) is a native of the sea beaches and sand dunes from New Brunswick to the Carolinas; growing inland as far as recent ocean soil formations exist. Although it has long been commercialized, especially in Massachusetts, no previous work has been published on its chemical composition or on the various fruit products made from it. For jelly the fruit is slightly deficient in pectin but it contains sufficient for jam or butter. Compared with some other plum varieties it is relatively high in ash and carbohydrates and slightly low in protein. It contains a significant amount of carotene.
42. INGRAM, C. 634.23-1.523
Cherry hybrids.
Gdnrs' Chron., 1942, 112: 163.
The author records his experiments in the hybridization of cherry species.
43. CONDIT, I. J. 634.37
Fig characteristics useful in the identification of varieties.
Hilgardia, 1941, 14: 1-69, bibl. 129.
A comprehensive illustrated account of the morphological characters of fig fruits, leaves, latex, habit of growth and hardness in different varieties.
44. EVREINOFF, V. A. 634.451
Le plaqueminier du Japon ou kaki (*Diospyros kaki*). (The Japanese persimmon or kaki.)
Rev. hort., 1941, 113: 343-6, 367-9, 399-402, 435-6, 463-6, 495-7.
A painstaking account of the botanical and horticultural aspects of *Diospyros kaki* with special reference to its cultivation and development in Europe. Outline drawings support the descriptions of many of the types selected for mention.
45. BERNDT, W., U. FR. DORNER. 634.22
Zwetschenanbau (Zwetschen cultivation).
Rud. Bechtold & Co., Wiesbaden, 1941, pp. 71, 220 RM, from review *Forschungsdienst*, 1942, Vol. 14, abstr. p. 10.
SCOTT, D. H., AND CULLINAN, F. P. 634.25:581.45
The inheritance of wavy-leaf character in the peach.
J. Hered., 1942, 33: 293-5, bibl. 2.
Propagation.
46. KAWAKAMI, S., AND ISIMARU, T. 577.15.04:634.22+634.21
Mume and apricot growing in cold districts. (A).
The effect of growth substances on grafting and budding. [Japanese.]
J. hort. Ass. Japan, 1941, 12: 123-42, bibl. 27.
The optimum aqueous solution of heteroauxin for use in budding plums was found by tests to be 0.01%. When applied in lanolin paste, which although always resulting in a certain amount of injury proved more satisfactory than the water solution, the best concentration was 0.1%. Applications of heteroauxin in lanolin when spring grafting were unsuccessful. Vaseline and hydrated and dehydrated lanoline proved to be the best solvents for heteroauxin. Substances containing lard, turpentine, etc., were very unsatisfactory for the purpose, both as being poor solvents and as hindering callus formation. This may be due to their having too low melting points. The defects of coating materials were found to be accentuated when used on immature tissue and to vary somewhat with different varieties.
47. BROADFOOT, H., AND WHITTAKER, E. C. 631.541.44:634.11+634.13
Reworking apple and pear trees.
Agric. Gaz. N.S.W., 1942, 53: 367-71, 421-3, 477-80.
The reworking of established apple and fruit trees is described and illustrated. The principal methods of grafting are dealt with, special attention being paid to the various grafts which can be used in frameworking.
48. CESAR, H. P. 634.451-1.541.5
Novo processo para enxertia do caquizeiro. (New method of grafting the kaki.)
Rev. Agric. S. Paulo, 1942, 17: 269-75.
By budding seedling *Diospyros kaki* with choice varieties 6 to 9 months after germination of the stock seed a gain of 18 months is obtained over the usual method of grafting which requires 3 years before the plant so treated is fit for transplanting or sale. Budded plants can be transplanted much sooner and their smaller size results in a considerable saving in nursery labour, packing and transport. They occupy the nursery beds for a shorter period and the mortality when travelling long distances is greatly reduced.
49. SMITH, H. 631.546:634.11+634.13
Some aspects of cordon fruit cultivation.
Gdnrs' Chron., 1943, 113: 16-7.
A description of the best method of starting a cordon apple and pear plantation with suggestions as to varieties and stocks.
50. D(UN)STER, B. P. 631.546:634.1/2
L'arcure. (Bending the branches of fruit trees.)
Gdnrs' Chron., 1943, 113: 7.
An old system of apple and pear tree training known as l'arcure [see *H.A.*, 9: 1173] is being revived and has given excellent results as regards cropping, economy of space, etc. On a post and wire framework, as used for cordons, strong maidens 4 ft. high are planted erect 3 ft. apart as early as possible in the planting season and are left unpruned. In the following May the trees are arched over to form a

semi-circle with the highest point of the arc 18 in. from the ground. During the summer all vertical laterals except the one on the top of the curve are pruned hard back and at the end of August this remaining shoot is bent into a similar arc in the opposite direction. A similar procedure continues yearly till the desired maximum is reached. There is very little superfluous growth and the result is the formation of short spurs. Most cordon varieties will respond to this treatment on Malling Quince A stock for pears and Nos. IX or II for apples, according to the quality of the soil.

Pollination.

51. VANSSELL, G. H. 581.162.3:638.14
Factors affecting the usefulness of honey bees in pollination.
Circ. U.S. Dep. Agric. 650, 1942, pp. 31, bibl. 13, 10 cents.

Observations over several years in Oregon and especially at Camino, Calif., are here summarized. At Camino honey bees were much the most common blossom visitors (62%) with blowflies next (23%) and others far behind. The bees were practically the only distributors of pear pollen. They were seen to visit emasculated as well as untouched flowers. The following average sugar concentrations of nectar from fruit blossoms were obtained on one day at Davis, Calif.:—apple 46%, peach and nectarine 28.9%, plum 25.8%, sour cherry 23.5%, Winter Nelis pear 9.9% and Bartlett pear 7.9%. Bees shift from one plant to another in search of nectar having the highest sugar concentration, but the reason for their selection of certain plants for pollen is not yet established. Strong overwintered colonies were found to surpass package bees in population, flight activity and amount of pollen gathered. The larger, i.e. 5 lb., packages, were more effective than the smaller ones.

52. MATSUBARA, S., IKEDA, M., AND TEZIMA, K. 634.22:581.162.3
On the sterility of Mume. [Japanese.]
J. hort. Ass. Japan, 1941, 12: 113-22, bibl. 7.

Observations show that in the mume plum perfect flowers occur in the earlier and middle part of the flowering period and imperfect flowers from the late middle on to the end of the period. The variety Koshu Saisho produced few flowers. It was also noted that in years marked by large numbers of perfect flowers, imperfect flowers were few and vice versa. Short and intermediate branches tended to bear many imperfect flowers and long and very long branches to bear many perfect flowers. Moreover it was found that on the long and intermediate branches, the lower down the branch the greater was the tendency to perfect flowers. Fertility was greatest as the result of cross pollination. Only Koshu Saisho produced an economic crop without cross-fertilization.

Growth and nutrition.

53. MURNEEK, A. E. 634.11:581.192
Quantitative distribution of nitrogen and carbohydrates in apple trees.
Res. Bull. Mo. Exp. Stat. 348, 1942, pp. 28, bibl. 38.

Well-developed 18-year-old bearing trees of the apple varieties Jonathan, Grimes and Delicious were used as material for the studies described here. Two carefully selected uniform trees constituted a field sample in each case. Observation samples were taken from the trees from 12 October to 28 December. They were excavated and dismantled and the findings summarized as follows:—
1. Apple trees weighed, in the fall, 850 to 1,000 lb., of which 20-30% constituted the roots. Approximately 62-65% of the tops and 53-57% of the roots was made up of dry matter. 2. These trees contained about 2 lb. of nitrogen of which three-quarters was above ground. Roughly 30% of the dry weight of the top portion of the tree and

40% of the roots represented 'available carbohydrates'—hemicellulose, starch and sugars. Though quantitatively smaller, the last two forms should be considered the chief storage carbohydrates of the apple tree. Starch concentration in roots was 3 times (up to 18% of dry matter) that in the top part of the tree. Roots were also higher in sugar content. 3. Leaves of apple trees contained, in October, 1.5% of nitrogen, on dry weight basis, which dropped to below 1% preparatory to abscission. The concentration of N in branches varied basipetally from .8 to .2% with similar differences in the root system. There was a relatively high accumulation of soluble nitrogen in the small roots, suggesting fall-absorption of this element from the soil. 4. Of the analysed carbohydrates, the branches contained 20-25% hemicellulose, about 5-6% starch and almost the same concentration of sugar. Starch and to some extent also sugar reserves of the root system were conspicuously high, with 15-18% and 6-8%, respectively, on the basis of total dry matter present. 5. Autumnal migration of nitrogen and carbohydrates, between October and end of December, was clearly evident in these apple trees. Nitrogen moved from the leaves into the twigs and thence into older wood and the roots, where a possible upward movement of N from the soil into the small roots was met. 6. Alterations in and migration of carbohydrates in the fall and early winter were somewhat difficult to ascertain. There was a sharp increase in sugar concentration, throughout the tree, between middle of October and end of December, with a corresponding reduction in starch, which is ascribed to hydrolysis effected by relatively low temperature. 7. The possible bearing of nitrogen and carbohydrate reserves in apple trees to growth and development, especially fruit production, and to time of pruning and tree removal is discussed."

54. TUKEY, H. B., AND YOUNG, J. O. 634.11:581.145.2:581.47
Gross morphology and histology of developing fruit of the apple.
Bot. Gaz., 1942, 104: 1-25, bibl. 28.

Very great detail is given of the gross development and principal tissue changes in the fruit of the apple from 1 month before full bloom throughout the growing season to fruit ripening, the apples used varying from Lodi (very early variety), Early Harvest, Twenty Ounce and McIntosh to Rome (late variety), and particulars being taken in one or more of five growing seasons.

55. CHILDERS, N. F., AND WHITE, D. G. 634.11-2.181
Influence of submersion of the roots on transpiration, apparent photosynthesis, and respiration of young apple trees.
Plant Physiol., 1942, 17: 603-18, bibl. 14.

Transpiration and apparent photosynthesis were reduced (sometimes almost to extinction during the longer periods) within 2 to 29 days, usually 2-7 days after the roots of young apple trees growing in soil in 5 gallon containers had been submerged. Apparent respiration was increased within 2 days and returned to pre-treatment rate after the soil had been drained. Leaf temperature and the behaviour of stomata could not be correlated with low leaf activity due to root submergence. Leaves from submerged trees contained less water and ash per unit of leaf surface than leaves from check trees. The development of new roots and the formation of root hairs were inhibited by submergence. [From authors' summary.]

56. MIYABAYASHI, T. 634.451:581.192
Varietal differences in the tannin cell in different kaki varieties. [Japanese.]
J. hort. Ass. Japan, 1941, 12: 143-54, bibl. 16.

The size and distribution of tannin cells are found to be varietal characters not noticeably related to the locality of growth. The distribution in the fruit varies. Thus in the region close to the pericarp, particularly at the base where

the development is believed to be vigorous, the tannin cells, being of elongated shape, with short horizontal and long vertical diameters, are densely distributed.

57. TUKEY, H. B.

631.547.6: 634.11+634.13+634.23+634.25

Forecasting the time of fruit harvest by blooming dates.

Wis. Hort., 1942, 33: 59-60.

The study of the records for a period of years for 61 varieties of apples, 14 of pears, 46 of cherries and 15 of peaches at Geneva, N.Y., shows that the number of days between full bloom and fruit maturity is very similar from year to year for a given variety. A few representative examples are given. Such variation as occurs will be found in those varieties with the shortest periods between full bloom and maturity and is only a matter of 2 or 3 days. It is suggested that orchard operations might usefully be timed on this system rather than by fixed calendar dates.

Soils, manuring and cultural practice.

58. STEPHENSON, R. E., AND SCHUSTER, C. E.

634.5-1.51

Soil properties of tilled orchards compared with untilled areas.

Soil Sci., 1942, 54: 325-34, bibl. 11.

Most of the soils studied were supporting walnut or filbert orchards 20 to 30 years old. They had either been continuously clean-cultivated or winter-cropland and summer cultivated. Observations and analyses lead the authors to the following conclusions:—"Some cultivated orchard soils in western Oregon contain one-fifth to two-fifths less organic matter than do similar uncultivated soils. Availability of phosphorus based upon chemical methods may be reduced as a result of long continued cultivation, partly through nutrient and organic matter depletion and the unfavorable biotic changes that have taken place. An appreciable change in soil structure is associated with tillage and organic matter depletion. Tillage pans that interfere with water penetration and with proper functioning of the soil are common in cultivated orchards. The immediate soil surface may become dispersed and run together until water cannot penetrate. Many soils are more spongy and porous a few inches below the depth disturbed by tillage than in any other part of the profile. This layer is full of large easily visible cavities, probably the result of undisturbed insect and other animal life in the soil."

59. BARNETT, R. J.

634.11-1.87+1.542

The Atchison experiment orchard.

Bull. Kans. agric. Exp. Stat. 301, 1942, pp. 31.

"October and the first part of November had passed with no weather condition arising to halt any of the physiological activities of the orchard trees. During the period 10 to 13 November temperatures of near zero came in with a high north wind and a small amount of snow. This change from growing to arctic temperatures proved disastrous to nearly all the fruit trees in the Atchison orchard as well as in most other parts of the northern half of Kansas." So ended prematurely an experimental orchard of apple trees with two rows of cherries covering an area of 9 acres planted in 1931. The chief experiments concerned pruning and soil management methods. The pruning aimed at a modified leader tree. Notes of growth records are given. The growth was greatest under a system of straw mulch, and decreased relatively under maize as intercrop, cowpeas as cover crop, winter vetch as cover crop, being least under red clover sod. Figures are also given of rainfall and soil moisture under the different systems.

60. ASHWORTH, M. R. F.

631.875

Changes occurring in the organic matter during decomposition of compost heaps.

J. agric. Sci., 1942, 32: 360-72, bibl. 10.

The decomposition has been studied of the organic matter of four composts of which the bulk materials were respectively

grass cuttings plus a percentage of beech leaves, fresh oat straw, sphagnum peat, mixed cotton grass and sphagnum peat with a small proportion of rush (*Scirpus*) and ericaceous plants. The grass and straw underwent changes which increased their resemblance to dung, while the peats remained more or less unaltered and their value as composting material is as absorbents of water soluble material, e.g. ammonia liberated in the process of composting.

61. HOWARD, A.

635.1/7: 631.875

Some gardening lessons from the orient.

Gdnrs' Chron., 1942, 112: 176-7.

In the East rice seedlings are sown in soil exceedingly rich in humus obtained partly from animal wastes. "The young plants are thereby converted into veritable arsenals of such things as nitrogen, potash, phosphates and so forth, all in organic combination." After transplanting to the rice fields these reserves of nourishment are of great value to the subsequent growth of the plants which, in spite of a check involving considerable delay, always do better than the broadcasted crop which grows without interruption. Sir Albert Howard suggests that similar benefits can be obtained in temperate climates by sowing vegetable and flower seeds in drills on specially prepared humus compost with a thin layer of soil above, subsequently pricking out into similar compost. Again the top-dressing of seedlings of which the planting out is delayed by weather, etc., with a finely divided compost gives an immediate response and results in strong plants. Spectacular results are claimed in the case of mixed salad crops top-dressed with compost and of mixed seeds (e.g. carrots and lettuce) sown on a composted surface and covered with a second layer of compost. It is claimed that running out or deterioration of a variety or strain is unknown in those parts of the East where humus is freely used. The use of artificial manure to the exclusion of organic manures is blamed for many of these troubles including the collapse of the Bourbon sugar cane. The explanation is to be found in the reduction of the mycorrhizal association which cannot flourish in the absence of humus. The circulation of protein from soil to plant and animal and back again is interrupted and a link in the chain of life is weakened. These statements could be tested by long term experiments and suggestions are made as to the conditions in which Experiment Stations should carry them out. In the case of hydroponics much useful information could be obtained if plants grown in liquid nutrient cultures were compared with plants grown on floating timber rafts bearing a foot deep cover of humus, as in Kashmir. In conclusion the author claims, with examples, that crops highly manured with organic compost do not suffer from pests or diseases. Royal Sovereign strawberries propagated from badly virus-infected stock and grown by him in heavily composted soil produced a richly flavoured crop and were entirely free from virus.

62. ASHMORE, S.

631.831

Potash from rubbish fires.

Gdnrs' Chron., 1942, 112: 203.

Contains an instructive account of how to build and maintain a rubbish fire to produce the maximum amount of potash-containing ash. Maintenance includes the keeping of the fire alight, for several weeks if need be, without infringement of the black-out regulations.

63. WILDE, S. A., AND WITTENKAMP, R. 631.82/87

Duff briquette fertilizers: their preparation, use and effect upon the growth of trees and other plants.

J. Amer. Soc. Agron., 1942, 34: 736-46, bibl. 12.

The briquettes are made of a mixture of partially decomposed forest litter (or duff), lacustrine clay and fertilizer salts. They contain 0.1 g. total fertilizer salts per c.c. and have a NPK ratio approaching 4:3:5. Briquette sizes were 2×2×4 or 1×1×2 inches. They are placed in the soil as near the feeding roots as possible or in the planting holes

at time of planting or on the surface in the case of quick growing crops. For pot plants the dose is 1 c.c. briquette per gallon of soil. Plants in the ground are dosed according to size. Results were very satisfactory especially in the case of plants suffering from starvation.

64. PARBERY, N. H., AND SWABY, R. J. 631.84: 631.87
The efficiency of organic materials in supplying nitrogen to crops.
Agric. Gaz. N.S.W., 1942, 53: 357-61.

A short account of experiments conducted by the authors to measure the extent and rate of the release of nitrogen from some 60 organic materials. The recovery of nitrogen from high analysis organic fertilizers was high and compared favourably with that from sulphate of ammonia. No plant material containing less than 1.5% nitrogen gave a positive return of nitrogen, and an early return coinciding with the demands of the crops was obtained only when the nitrogen content of the materials was above 2.5%. Excessive amounts of nitrogen proved harmful in the early stages of a crop and this sometimes persisted until after the first harvest.

65. WHEETING, L. C., OVERHOLSER, E. L., AND VANDECAVEYE, S. C. 631.8: 635.1/7 + 634.1/8
The farmer's fertilizer handbook.
Pop. Bull. Wash. agric. Exp. Stat. 165, 1942, pp. 7 + 4 tables.

Notes on the broad functions of N, P, K, Ca, S, B and Zn are followed by directions on how to use the formulae appearing on commercial fertilizer bags to supply the nutrients necessary to different crops to the best advantage. Crops considered include the following:—roots, pod crops (e.g. peas, beans, maize), leaf crops, asparagus and bine crops (e.g. tomato, cucumber, etc.), dewberries, raspberries and blackberries, grapes, strawberries, mature pome and mature stone fruit crops.

66. NEW JERSEY. 631.8: 633/635
Wartime fertilizers for New Jersey.
Circ. N. Jer. agric. Exp. Stat. 452, 1942, pp. 8.

The use of nitrogen for war purposes has resulted in a shortage of inorganic nitrogen for agricultural use. Suggestions are made in this bulletin for the more efficient use of nitrogenous fertilizers for agricultural and horticultural crops. The general suggestions made are:—Use more lime; grow more leguminous cover crops between market crops;

rest unprofitable land in sod or green manures; dress farmyard manure with superphosphate (50 lb. per ton) and apply as soon as possible after production; use organic wastes, e.g. wool wastes, sewage sludge, etc.; prepare seedbeds more thoroughly; use starter solutions, e.g. fertilizers 4-10-10, 4-12-4, etc., dissolved in water, at transplanting. Particular hints are also given for individual fruit and vegetable crops.

67. KILPATRICK, D. T. 634.13-1.542
The pruning of the Williams pear.
Agric. Gaz. N.S.W., 1942, 53: 321-4.
COLDWELL, A. E., LOEWEN, P. R., WHITFIELD, C. J. 631.459
The relation of various types of vegetative cover to soil drift.
J. Amer. Soc. Agron., 1942, 34: 702-10, bibl. 2.
LARSON, C. A. 631.415.3
Reclamation of saline (alkali) soil in the Yakima Valley, Washington.
Bull. Wash. Exp. Stat. 376, 1939, pp. 39.
Results are not very clear cut.

Marketing.

68. BUCHANAN, M. T., AND DUMMEIER, E. F. 634.11: 658.8
The marketing of Washington apples in Los Angeles, California. Part II. Retail distribution.
Bull. Wash. agric. Exp. Stat. 415, 1942, pp. 68, bibl. 16.

Results of this study indicate that the best results were achieved by those retailers who purchased apples often, say 4 or more times a week, sold at relatively low retail prices, displayed apples for only a short time before sale, kept reserve supplies under refrigeration, used large surface areas of apple display, and advertised. Among points of interest discussed are retail prices and gross margins, marketing costs, waste and spoilage, display and advertising.

69. BUCHANAN, M. T. 634.11: 658.8
Washington apples on the New York and Chicago fruit auctions.
Ext. Serv. Bull. Wash. St. Coll. Agric., 275, 1941, pp. 8.
A less detailed version of *Bull. Wash. agric. Exp. Stat.* 401; *H.A.*, 12: 42.

SMALL FRUITS AND VINES.

70. GUILLAUMIN, A., AND GUINET, C. 634.7: 577.16
Actinidia chinensis Planchon, liane fruitière d'Extrême-Orient intéressant pour nos cultures et pour l'hygiène alimentaire. (A useful fruit-bearing climber.)
Rev. hort., 1941, 27: 315-9.

The horticultural history of the climber, *Actinidia chinensis*, is reviewed and notes given on its cultivation out of doors for its fruit. It is dioecious, deciduous and a strong grower. Fruits are borne singly or in groups of 2 or 3 and are of the size of a walnut, covered with reddish brown hairs, pulpy, and of an agreeable flavour. The plant seems hardy enough, having survived in France winter temperatures of —16°C. It can bear heavily, the single plant at the national natural history museum, France, having produced in 1940 about 170 lb. of fruit. The fruit can be eaten raw, cooked, bottled or in the form of jam. A note by Mme L. Randoin and Mlle J. Boisselot of the Société de Biologie mentions that of all fruits that can be eaten raw it is the richest in vitamin C, its antiscorbutic value at equal weights being 6 times that of the orange or roughly 300 mg. vitamin C per 100 g. of pulp.

71. GOMOLJAKO, L. G. 634.724: 577.16
Über eine neue Quelle des Karotins (Provitamin A). (Buffalo currant (*Ribes aureum*) a new source of carotene.)
C.R. Acad. Sci. U.R.S.S., 1941, 32: 142-3.

Trials of the fruit of *R. aureum* plants raised from seed received from the U.S.A. and sown near Leningrad in 1928 show that they contain more sugar than red currants and as much as those black currant varieties which have the highest sugar content, i.e. up to 12%. *R. aureum* contains rather more vitamin C than the red but considerably less than the black currant. As regards carotene *R. aureum* is vastly superior to both the red and the black currant with a content of about 5 mg. % as against 7-15 mg. % in carrots.

72. KRAMER, A., AND SCHRADER, A. L. 634.73-1.8 + 2.19
Effect of nutrients, media and growth substances on the growth of the Cabot variety of *Vaccinium corymbosum*.
J. agric. Res., 1942, 65: 313-28, bibl. 13.

Observations were made on rooted cuttings of Cabot blueberry grown in peat-on-sand and sand supplied with

various nutrients and growth substances. In the peat-on-sand medium no symptoms of calcium, iron or sulphur deficiency were observed during the course of the experiments, and symptoms of boron deficiency were late in appearing. In the sand medium, iron-deficiency symptoms also were late in developing. With these exceptions deficiency symptoms appeared after different lengths of time in both media in the following order: nitrogen, potassium, sulphur, calcium, boron, magnesium, phosphorus, iron and manganese. The characteristic deficiency symptoms for each element were found to be sufficiently unlike to be easily identified, particularly those caused by nitrogen, potassium, boron, sulphur, magnesium and phosphorus. Leaf deficiency symptoms occurring in sand are shown in colour for nitrogen, potassium, sulphur, calcium, boron, magnesium, phosphorus and iron. The shoot-root ratio of plants growing in the peat-on-sand medium was greatly increased when manganese, iron, calcium, boron, or magnesium was omitted from the nutrient solution and decreased when sulphur, boron, phosphorus, or nitrogen was withheld from the sand-grown plants. There was a significant negative correlation between percentage of fresh weight and percentage of dry weight, but the results based on dry weight were practically identical with those obtained with fresh weights, since the differences in weight were sufficiently large to be maintained on a dry weight basis also. Lack of nitrogen significantly increased the rapidity with which terminal growing points aborted. There was a significant correlation between percentage of terminals aborted and top weight. Weekly applications of thiourea and vitamin B₁ had no significant effect on the deficiency symptoms, fresh or dry weights of the plants, or growing-point abortion. [From authors' summary.]

73. O'ROURKE, F. L. 634.73-1.535
The influence of blossom buds on rooting of hardwood cuttings of blueberry.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:
332-4, bibl. 1.

Rooting of blueberry cuttings which show leaf buds only is very greatly superior to that of cuttings which possess one or more flower buds, but results from the removal of the flower buds from the latter do not compensate for the labour costs involved.

74. CHANDLER, F. B., AND MASON, I. C. 634.73-1.51
The effect of mulch on soil moisture, soil temperature and growth of blueberry plants.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:
335-7, bibl. 4.

Two years' experiments in Maine show that mulch retains soil moisture better than clean cultivation, reduces the growth of blueberries in sandy soils and increases their growth in clay loam.

75. SAVAGE, E. F., AND DARROW, G. M. 634.73-1.51
Growth response of blueberries under clean cultivation and various kinds of mulch materials.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:
338-40.

Mulching proves essential to the cultivation of highbush blueberries in northern Georgia. Sawdust mulch proved superior to oak leaves or rye straw and its use is recommended.

76. PERLMUTTER, F., AND DARROW, G. M. 634.73-1.4-1.8: 614.014.44
Effect of soil media, photoperiod and nitrogenous fertilizer on the growth of blueberry seedlings.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:
341-6, bibl. 1.

A mixture of two-thirds forest litter with one-third potting soil proved best for blueberry seedlings. Their vegetative

growth was greatly increased by extending the photoperiod during the short days of winter. No significant increase in growth was obtained by applying urea, nitrate of soda or ammonium sulphate during an early stage in the life history of the seedlings.

77. CLARK, J. H., AND GILBERT, S. G. 634.73: 581.45
Selection of criterion leaves for the identification of blueberry varieties.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:
347-51, bibl. 6.

Measurements for two years of certain varieties of blueberry from two sources indicate that tip angle, base angle, and leaf width/length ratio are valuable and relatively constant variety characters. On weak plants, however, the base angle tends to be absolutely and relatively narrower than on vigorous plants.

78. JOHNSTON, S. 634.73-1.523
Observations on the inheritance of horticulturally important characteristics in the highbush blueberry.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:
352-6.

Trials in Michigan indicate that certain blueberry varieties tend to transmit particular growth characters to their offspring.

79. HEROLD, G. 634.75
Sortenprüfung bei Erdbeeren unter besonderer Berücksichtigung der Befruchtungsverhältnisse.
(An examination of strawberry varieties with particular reference to fruiting conditions.)
Gartenbauwissenschaft, 1941, 16: 216-62, from abstract *Forschungsdienst, 1942, Vol. 14, abstr. p. 25.*

The author examined 76 varieties of strawberry during two periods. Of them 12, 4 in particular, proved to be female, the rest hermaphrodite. For pollen germination tests a 15 to 20% raw sugar solution proved the best medium. Morphologically distinguishable pollen degeneration varies with varieties from 5 to 75%. On the average pollen germination ran parallel with pollen degeneration. In isolation tests of 45 hermaphrodite varieties for self-fertility, 20 showed a very good set of fruit, 7 a very poor one. Notes were also made of susceptibility to white spot disease (Weissfleckenkrankheit), red spider and frost. Illustrated descriptions were given of varieties hitherto undescribed.

80. CHILDS, W. H. 634.75-1.533
Some plant-spacing results with six strawberry varieties.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:
357-60, bibl. 1.

Spacing at 8 inches apart gave higher and better yields than matted row planting in 7 out of 8 strawberry varieties.

81. BRIERLY, W. G., AND LANDON, R. H. 634.75-2.111
Experimental "smothering" of dormant strawberry plants.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:
361-6, bibl. 3.

To test causes of winter injury.

- CRANE, J. C., AND HAUT, I. C. 634.75-1.533
The influence of various renewal systems and width of row on yields of the Blakemore strawberry.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:
368-72, bibl. 1.

82. ROBERTS, R. H., AND STRUCKMEYER, B. E. 634.76
Growth and fruiting of the cranberry.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:
373-9.

The cranberry shows a consistent relationship between length of growth made by the uprights and amount of fruit

produced. In Wisconsin trials large yields were secured when the average growth was between $2\frac{1}{2}$ and $3\frac{1}{2}$ inches long. This appeared to be the optimum growth for several varieties. Attempts to regulate growth and their effects on fruiting are discussed. Diagrams are given showing the cranberry blossom and its development. The degree to which optimum growth conditions for fruiting may shift with variety, location or culture still remains to be decided.

83. LYON, A. V., AND TISDALL, A. L. 634.873-1.67+1.62
Production of dried grapes in Murray Valley Irrigation districts. 2. Irrigation, drainage and reclamation.
Bull. Coun. sci. industr. Res. Aust. 149, 1942, pp. 35, bibl. 6.

A summary is given of the irrigation and drainage studies made by members of the Commonwealth Research Station, Merbein, as affecting commercial horticulture in the Murray Valley. Methods of irrigation and the effect of soil type on the efficacy of different methods are discussed. In early days in the Mildura settlement, which is mainly under vines, there were only 3 irrigations per season. There are now normally 4 pre- and 2 post-harvest irrigations, the multi-furrow method being the more usual. An outline is given of the present community system of irrigation. In most forms of reclamation some form of underground drainage has been found necessary. The range of drainage systems in local use is outlined with particular emphasis on those which have proved most useful. There is a double problem:—the draining of the subsoil water from horticultural properties at relatively shallow depths (internal drainage) and its removal from the area of settlement (external drainage). Internal drainage has been studied in some detail in relation to soil type and recommendations for

tile drainage are made based on consideration of hydraulics, soil profiles and economy.

84. TISDALL, A. L. 634.8-1.62
Drainage investigations in the horticultural soils of the Murray Valley.
Pamphl. Coun. sci. industr. Res. Aust. 113, 1942, pp. 23, bibl. 12.

The reasons why drainage is essential in the Murray Valley vine soils are discussed. The provision of drainage outfalls is described. A brief account is given of investigations into the drainage of individual soil types and the methods used to measure drainage efficiency are outlined. The factors to be considered in internal drainage are discussed and recommendations are made as to optimum depths and spacings for tile drains on the major soil types of the area.

85. SNYDER, J. C. 634.851+634.847
Growing grapes in Washington.
Ext. Serv. Bull. Wash. St. Coll. Agric. 271, 1941, pp. 34.

Recommendations on the methods of cultivation most likely to succeed with both American and European grape varieties in Washington. Particular attention is devoted to pruning and training methods. Propagation methods, including topworking, are considered. The characters of 11 European and 20 American varieties are discussed.

86. BELL, T. A., AND OTHERS. 634.848: 577.16
Ascorbic acid content of seven varieties of muscadine grapes.
Food Res., 1942, 7: 144-7, bibl. 21.

Of the seven varieties of vine tested, Scuppernong samples showed the highest average, viz. 6.8 mg./100 g., and Hopkins the lowest, viz. less than 0.2 mg./100 g.

PLANT PROTECTION OF DECIDUOUS FRUITS.

87. BEYER, R. 634.11-2.111
Über die Winterhärte von Apfelsorten. (Winter hardness of apples in Germany.)
Dtsch. Obst., 1941, Heft. 9, p. 174, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 25.
 It may be noted that of English varieties in East Prussia Ribston Pippin, which had come through the 1928/29 winter successfully, was completely killed by the winter of 1939/40.
 88. PASSY, P. 632.111: 631.541
Transmission de la résistance au froid par la greffe. (Transmission of cold hardiness by grafting.)
Rev. hort., 1941, 27: 209-10.

In the severe winter of 1939-40 *Cotoneaster frigida* (in France) was killed to the ground and did not recover. In cases where the harder *C. salicifolia* had been budded on to branches of *C. frigida* the *frigida* stocks were uninjured, though those branches on the same plants which had been left unbudded were killed. Thus the scion would appear to have imparted some of its hardness to the stock.

89. STORCK, A. 632.111
Über die Eignung von Glasfasermatten als Kälteschutz. (The suitability of glass fibre mats for protection against cold.)
Blumen- u. Pflb., 1941, 45: 401-2, 421-2, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 9.
 Three winters' experiments have shown that valuable protection is offered against cold by glass fibre mats, but that the method of using them needs further investigation.
 90. CROCE, F. M. 632.111: 634.11+634.51
Ruptura de ramas de los arboles frutales por efectos de la nieve. (Breakage of fruit tree branches by snow.)
Rev. A.P., 1942, 25: 298: 43, 45-7, 49.

Walnut and apple trees were extensively damaged by snow breakage in Mendoza Province, Argentina, in November

1941. Of the apples Delicious was the only one so affected. In the case under discussion the trees, some of which were split to the ground, were successfully repaired by bolting the split portions together, the bolt being inserted through the trunk or branch and tightened by a nut at the point of emergence. Branches likely to break were further supported by galvanized wire strands all running at a common level from each branch to an iron ring in the centre of the tree. The attachment at the branch end was presumably by means of a ring screwed into the wood.

91. OSTERWALDER, A. 634.1/8-2.13
Verhageltes Obst. (The effect of hail on fruit.)
Schweiz. Z. Obst. u. Weinb., 1942, 51: 425-8.

The author shows with illustrations how in young fruit cork layers will generally form just beneath the area damaged by the hail, in which case no further damage occurs. Whereas, in ripier fruit not only does the cork layer not form but the chemical composition of the cell sap encourages the growth of fungal spores and so the spread of the damage.

92. MOORE, M. H., AND ROGERS, W. S. 632.112: 634/635
Sunscauld of fruits.

Gdnrs' Chron., 1942, 112: 166-7, bibl. 1.
 A description is given of sunscauld symptoms on peach, apple and tomato first seen [at East Malling Research Station] after the occurrence of a short period of very high temperatures with many hours of sunshine at the end of August 1942. [Authors' summary.]

93. ANON. 632.19: 631.454
Tell-tales of soil deficiencies.
Gdnrs' Chron., 1942, 112: 244.

Strong growths of daisies, sorrel, heartsease, plantain and spurrey indicate increasing soil acidity; on light soils where they are native, prevalence and vigour rather than mere presence are the signs. Increases in wild clover and vetch,

*especially with abundance of nodules, indicate nitrogen shortage. Sorrel, yarrow, German chamomile and henbane suggest phosphatic, and foxglove, corn marigold, broom, gorse and buttercup lime deficiencies. Sour soil breeds rushes, mare's tail, sedges, flags and tussock grass. Persistence of dandelion and other tap root weeds when other herbage turns brown in summer shows lack of humus. Leafy crops with pale or yellowish green foliage and stunted growth need nitrogen; lettuces and brassicas signal this deficiency by purple or reddish colouring in their early stages. Leaf scorch with pale brown or yellow leaf edges indicates lack of potash; in potatoes and root crops this need is shown by dark green foliage and poor root formation, in fruit trees by slow growth and failure to set fruit properly. Lack of phosphorus is shown by slow maturing, by a bronze tipped leaf in leafy crops and by a brownish-centred leaf in fruit trees. Lack of boron or excess soil acidity in brassicas is indicated by club root and in celery by split stalks.

94. MEIER, K. 632.19: 634.1/8
Ueber Gelbsucht an Obstbäumen, Reben und
Gartenpflanzen. (Chlorosis in fruit trees and
bushes and in garden plants.)
Schweiz. Z. Obst- u. Weinb., 1942, 51: 357-61,
bibl. 4.

A brief review of the more usual causes of chlorosis in fruit trees and vines. They are:—(1) Lack of nutrients in the soil, insufficient nitrogen or potash often being a cause, insufficient phosphates less frequently. (2) Unfavourable physical condition of soil resulting from natural pan, compression by treading, etc., covering with stones, compost, etc., stagnant water or persistent non-cultivation. (3) Temperature changes, especially low temperatures during prolonged wet periods.

95. ANDERSON, H. W. 634.11-2.19
Calyx end injury to apples.

News Letter Ill. St. hort. Soc. 7, Oct. 1942, p. 1.
A note on blackening of apples at the bottom of the calyx cup. The injury is caused by arsenic acid resulting from the contact of lead arsenate and water and is especially prevalent during seasons of unusual humidity in Illinois.

96. TAKAHASHI, W. N. 632.8
A virus inactivator from yeast.
Science, 1942, 95: 586-7.

A virus inactivator has been extracted from yeast by autolysis and by autoclaving. The technique is described. Virus-infected scions of rose, peach and pear were placed in a solution of the inactivator for several days before being grafted on to healthy stock, but the treatment did not prevent the appearance of the disease. In the case of detached leaves from infected plants placed with their petioles in a solution of the inactivator for 9 days the inactivator entered the leaves but no conclusive evidence could be obtained of its entrance into the cells and the destruction of the virus. The results of various chemical tests with the substance are given.

97. HILDEBRAND, E. M. 634.22-2.8
Prune dwarf.

Phytopathology, 1942, 32: 741-51, bibl. 7.
Important information has accumulated on the dwarf disease of prune (*Prunus* virus 6; *Nanus pruni* H.) since the first description of symptoms, *Ibidem*, 1936, 26: 1145; *H.A.*, 1937, 7: 331. The damson plum (*Prunus insititia*) is a masked carrier of the disease, which may thus be more widespread than is realized. Spread is slow normally; sudden accelerations have been correlated with severe infestations of the green plum aphid, though so far insect transmission experiments have proved negative, only tissue union between stock and scion proving effective. Yield on affected prune types is less than 10% of normal; the Lombard plum had moderately severe foliage injury but yield was only slightly below normal and there was no damage to the pistils. Transmission tests from prune to

cherry have all been negative. Transmission to peach produced rather transitory foliage symptoms with some retardation of fruit especially on the suture side. Prune dwarf bears in peach a definite resemblance to peach rosette mosaic and studies to determine the relation, if any between the two are in progress.

98. THOMAS, H. E. 632.8: 634.1/2
Transmissible rough-bark diseases of fruit trees.
Phytopathology, 1942, 32: 435-6, bibl. 4.

The rough-bark type of virus disease of fruit trees makes a third group of which mosaic and yellows are the other two. Most of these rough bark diseases are little known; the author enumerates some of them.

99. BODINE, E. W., AND NEWTON, J. H. 634.23-2.8

The rasp leaf of cherry.

Phytopathology, 1942, 32: 333-5.

A disease of cherries manifesting itself by abnormalities of leaf growth, which are illustrated, is of a virus nature with a two-year incubation period.

100. CAIRASCHI, E. A. 632.8
Le problème de la transmission des maladies à virus des plantes. Rôle et importance des insectes vecteurs. (Plant virus diseases and insect vectors.)
Rev. hort., 1941, 113: 373-6.

The role of various insect vectors, which are named, in the spread of virus disease in garden plants, is briefly explained.

101. FRAMPTON, V. L., LINN, M. B., AND HANSING, E. D. 632.8
The spread of virus diseases of the yellows type under field conditions.
Phytopathology, 1942, 32: 799-808, bibl. 3.
BERKELEY, G. H., AND PLAKIDAS, A. G. 634.75-2.8

Strawberry leaf roll, a new [virus] disease.

Phytopathology, 1942, 32: 631-3.

- ZELLER, S. M., AND MILBRATH, J. A. 634.23-2.8

Banded chlorosis, a transmissible disease of cherry.

Phytopathology, 1942, 32: 634-5.

- HILDEBRAND, E. M. 634.25-2.8
Indexing cherry yellows on peach.
Phytopathology, 1942, 32: 712-9, bibl. 8.
A rapid transmission technique.

102. MONTGOMERY, H. B. S., AND SHAW, H. 632.314: 634.22 + 634.23

Laboratory tests of bactericides on the plum and cherry bacterial canker organism (*Pseudomonas mors-prunorum* Wormald.)

Ann. appl. Biol., 1942, 29: 399-403, bibl. 5.

In laboratory tests of 29 metals in the form of soluble salts, mostly nitrates, the most toxic to *Pseudomonas mors-prunorum* (Worm) were mercury, silver, gold, uranium, and copper, in descending order. Differences in toxicity among the various copper compounds and preparations could not be explained by differences in the hydrogen-ion concentration of the medium, but the outstanding activity of bordeaux mixture among the insoluble forms of copper was accountable in terms of the alkalinity produced by the lime component. The range of tolerance of the organism to hydrogen-ion concentration was about pH 3.2 to 10.4. [Authors' summary.]

103. ALENCAR, J. 634.16-2.4
Notas sobre a entomosporiose na ameixa amarela (*Eriobotrya japonica* Lindl.) (The fungus, *Entomosporium maculatum*, attacking loquat.)
Ceres, 1942, 3: 117-20, bibl. 6.

Entomosporium maculatum is a not infrequent fungus disease of the *Rosaceae*. It is reported for the first time on loquat

in Minas Geraes, Brazil, though often severe in the State of S. Paulo. It can be controlled by 1% bordeaux mixture with a casein spreader applied as a spray when the plant is making new growth.

104. WELSH, M. F. 634.11-2.411
Studies of crown rot of apple trees.
Canad. J. Res., 1942, 20, Sec. C, pp. 457-90,
bibl. 27.

Crown rot of apple trees, which in British Columbia is confined to the below-ground bark, is attributed to the fungus *Phytophthora cactorum*. Incidence seems to be affected by the interrelated effects of soil moisture and temperature, with highest incidence in an almost saturated soil at the highest temperature used in the experiments, namely 32° C. The influence of soil moisture is exerted more in the subsoil than in the actual locus of crown rot attack. Certain varieties of apples, McIntosh being one, have shown consistent resistance to the disease.

105. MILLER, P. A. 634.21-1.411
Phytophthora crown rot of loquat.
Phytopathology, 1942, 32: 404-9, bibl. 10.

A crown rot of the loquat, *Eriobotrya japonica*, attributed to *Phytophthora cactorum*, is reported for the first time in U.S.A. The disease appears to have been checked by control measures in which the dead bark and the healthy bark 1-1½ in. beyond the margins and through the cambium to the wood were cut out and a wash of ½ oz. dry bordeaux mixture to 1 pint of water applied to the treated areas with a brush.

106. COOLEY, J. S. 632.42: 634.11
Factors affecting distribution and severity of black root rot of apple trees.
J. agric. Res., 1942, 65: 299-311, bibl. 7.

Black root rot of apple (*Xylaria mali*) is not known to occur outside the U.S.A., where it is distributed from Pennsylvania to Georgia and westwards to Arkansas. Distribution may be partly dependent on the soil temperature being warm enough to allow the organism to thrive. In inoculation trials with apple, pear, plum, cherry and peach seedlings only the apple showed undoubted susceptibility. Analysis of variance of resistance showed only slight significance for variety in 19 own-rooted standard varieties of apple, while in the own-rooted seedling clones and variety seedlings there was no significance for variety. A definite correlation was established between infection and high temperature seasons. Longevity of the fungus varied considerably.

107. CARPENTER, J. B. 634.11-2.48
Mouldy core of apples in Wisconsin.
Phytopathology, 1942, 32: 896-900, bibl. 8.

Mouldy core of Dudley and Delicious apples in Wisconsin was associated with several fungi of which *Alternaria* sp. of the *A. tenuis* group was predominant. Undesirable morphological characters of the fruit (a calycine sinus connecting the central core chamber with the calyx tube) predispose these varieties to infection.

108. WILSON, E. E. 634.25-2.4
The effect of certain added materials on bordeaux mixture in the control of peach blight and leaf curl.
Hilgardia, 1942, 14: 491-515, bibl. 16.

The primary aim of the field tests reported here was to determine how such added materials as petroleum-oil emulsion affect the tenacity of bordeaux. The influence of oil on retention, coverage and toxicity was studied in the laboratory. In the field none of the additions affected the efficiency of bordeaux for leaf curl *Taphrina deformans*. Nor did bentonite (0.6 and 2.0 lb. per 100 gal. spray) or 1% cotton seed oil affect the tenacity of bordeaux or its control of twig infection by *Coryneum beijerinckii*. In the laboratory and when diluted bordeaux proved slightly more toxic to *C. beijerinckii* and *Sclerotinia fructicola* than oil-bordeaux.

109. PONTIS, R. E., AND HANSEN, H. N. 634.63-2.48
Olive anthracnose in the United States.
Phytopathology, 1942, 32: 642-4, bibl. 9.
Gloeosporium olivarum reported for the first time on olives for U.S.A.

110. FROST, S. W. 634.11-2.7
Common insect larvae that attack the apple in Pennsylvania.
Bull. Pa. agric. Exp. Stat. 420, 1942, bibl. 88.

The bulletin contains two keys, the one for the identification of the more important apple pests in Pennsylvania, the other for identification of the damage done by the various pests. The injuries suffered are considered but no mention is made of possible control measures.

111. MARSHALL, J. 634.11-2.753
The apple mealybug *Phenacoccus aceris* Sig. and its control by dormant sprays.
Sci. Agric., 1942, 22: 727-32, bibl. 3.

The result of 3 years' investigations are reported showing that the apple mealy bug *Phenacoccus aceris*, which causes considerable loss in Nova Scotia and British Columbia orchards, can be controlled by dormant sprays applied after the immature females have left their wintering cocoons and have resumed feeding. A 6% application of Diesel oil, 44 seconds Saybolt viscosity, was as effective and more economical in cost than crude petroleum oil of 108 viscosity at 100° F. If lime sulphur was added a greater residual effect was noticed than with oil alone. Effectiveness of oil was also increased by the addition of 1 or 2% dinitrocresol or dinitrocyclohexylphenol or the addition of oxalic acid to lower the pH. Water solutions of sodium dinitrocresylate and sodium dinitrocyclohexylphenate were more effective and less expensive than oil emulsions.

112. MARSHALL, G. E., CHILDERS, N. F., AND BRODY, H. W. 634.11-2.754
The effects of leafhopper feeding injury on apparent photosynthesis and transpiration of apple leaves.
J. agric. Res., 1942, 65: 265-81, bibl. 14.

Trials in Ohio showed that injury to Stayman Winesap apple leaves caused by apple leafhoppers (*Typhlocyba* spp.), grape leafhoppers (*Erythroneura* spp.) and the potato leafhopper (*Empoasca fabae*) was accompanied by reduction in apparent photosynthesis and transpiration, especially the former. The effect of the potato leafhopper on leaf metabolism was worse for a given number of leafhoppers than that of the other leafhoppers. *Typhlocyba* and *Erythroneura* types removed the contents of cells in the palisade layers, while the spongy mesophyll cells were not significantly affected unless the leaf had been severely injured. Consideration of the damage done early in the season shows that the early control of all these insects is important.

113. HERIOT, A. D., AND WADDELL, D. B. 632.78: 634.11
Some effects of nutrition on the development of the codling moth.
Sci. Agric., 1942, 23: 172-5, bibl. 8.

Immature tissues of the apple have a greater nutritive value than mature tissues. The absence of seeds did not greatly retard development of the larvae provided that immature apple pulp was available.

114. JONES, E. W., AND SHIRCK, F. H. 632.76
The seasonal vertical distribution of wireworms in the soil in relation to their control in the Pacific Northwest.
J. agric. Res., 1942, 65: 125-42, bibl. 7.

The vertical distribution of wireworms is found to vary considerably with the season, with soil temperature and moisture and with cropping conditions. Control measures, i.e. the use of different fumigants and baits, must vary accordingly.

115. UPHOF, J. C. T. 581.5: 632.796
Ecological relationships of plants with ants and termites.
Bot. Rev., 1942, 8: 563-98, bibl. 193.
A summary of literature.
116. JONES, L. K., AND SMITH, L. G. 634.7-2.3/4+2.6/7
Control of small fruit diseases and insect pests.
Ext. Serv. Bull. Wash. St. Coll. Agric. 180 (revised), 1942, pp. 15.
Discusses spray materials and briefly the control of pests and diseases of raspberries, blackberries, dewberries, strawberries, currants and gooseberries.
117. RHOADS, A. S. 634.1/7-2.4: 581.144.2
Growing new root systems by soil banking—a promising method of rejuvenating trees attacked by root diseases.
Phytopathology, 1942, 32: 529-36, bibl. 6.
The method consists in banking soil around the trunks of trees attacked by root diseases of various sorts. It is necessary for success first to excise and disinfect the affected parts and then to apply the aeration method by which the soil is removed from under the base of the attacked tree and the adjacent main roots to check development of the causal organisms by desiccation. No length of time for the desiccation period is given but it is described as brief (in Florida). In three or four years after banking the trees should have developed strong roots and be in full health. A series of photographs illustrates the strong new root growth obtained by this method.
118. OSTERWALDER, A. 581.111: 632.19: 634.1/7
Baumimpfungen? (Can trees be successfully injected?)
Schweiz. Z. Obst- u. Weinb., 1942, 51: 221-3.
Antitoxins and serum-therapy methods cannot be employed against plant diseases since in plants there is no circulatory system comparable with the blood stream of animals and there is no evidence that any reaction to infection on the part of the plant host affords protection against later infection. Four common plant diseases are mentioned as examples showing that primary infection does not protect the plant from secondary infections. The author records negative results from injection with a proprietary substance claimed to be effective against fungus diseases and insect pests of plants. A brief reference is made to the results obtained by other workers from injecting iron salts for the control of chlorosis. [The article makes no mention of the application of injection for the diagnosis of deficiency disorders. See *Tech. Comm. Bur. Hort.* 10, 1938.]
119. CARPENTER, J. B. 632.42: 634.11
A toximetric study of some eradicant fungicides.
Phytopathology, 1942, 32: 845-56, bibl. 29.
Under the experimental conditions *in vitro* Lignasan, Elgetol, a phenyl mercury oleate preparation, and a toluene derivative preparation all proved toxic to the test phytopathogens, including *Venturia inaequalis*. Limited studies of the suppression of the ascospore incubulum of *Venturia inaequalis* in overwintered apple leaves by Elgetol showed that this preparation was capable of giving rapid suppression.
120. HEUBERGER, J. W., AND HORSFALL, J. G. 632.952.2
Reduction in fungicidal value of copper compounds by organic materials.
Phytopathology, 1942, 32: 370-8, bibl. 6.
Material containing a considerable amount of protein, e.g. powdered derris, pyrethrum, soya and alfalfa, reduced the fungicidal value of copper sulphate, bordeaux, copper oxychloride and red and yellow cuprous oxide. There is probably a reaction between the toxic copper and the protein which reduces the amount of toxic copper available to the spores.
121. GOLDSWORTHY, M. C., CARTER, R. H., AND GREEN, E. L. 632.952.2
The fungicidal and phytocidal properties of some copper xanthates.
Phytopathology, 1942, 32: 497-504, bibl. 3.
The xanthates tested were prepared from methyl, ethyl, propyl, butyl and isoamyl alcohols. Results were not equal to those of normal orchard treatments with lime sulphur and copper phosphate sprays.
122. MARTIN, H., WAIN, R. L., AND WILKINSON, E. H. 632.952.2
Studies upon the copper fungicides. V. A critical examination of the fungicidal value of copper compounds.
Ann. appl. Biol., 1942, 29: 412-38, bibl. 25.
The germination of fungus spores exposed to known concentrations of different copper compounds was examined with the minimum of interference by impurities such as nutrient material or leaf excretions. The results obtained are described and a hypothesis is put forward concerning the mode of toxic action which will account for them.
123. PARKER-RHODES, A. F. 632.952: 546.49
Studies on the mechanism of fungicidal action. IV. Mercury.
Ann. appl. Biol., 1942, 29: 404-11, bibl. 4.
McCLELLAN, W. D. 632.952
Temperature as it affects spore germination in the presence of copper and sulphur.
Phytopathology, 1942, 32: 394-8, bibl. 7.
HYRE, R. A. 632.952.2
Relation of particle size and fungicidal value and tenacity of two "insoluble" copper fungicides.
Phytopathology, 1942, 32: 388-93, bibl. 13.
124. HALLER, M. H., AND OTHERS. 634.11-2.95
Further studies on the removal of spray residues from Eastern-grown apples.
Tech. Bull. U.S. Dep. Agric. 828, 1942, pp. 32, bibl. 20.
The degree of difficulty in removing spray residues varied with different varieties. The effects of adding mineral oil emulsion to different coding moth sprays on spray residue and its removal are noted. Using the most effective washing treatments for each type of washing machine no large or consistent differences were observed in the effectiveness of the different types, nor was there any large or consistent difference in results between flood and flood-brush machines. The effect of adding wetting agents under different circumstances and using different machines varied. The effect of heating the solutions also varied. Heating did not increase spoilage in York Imperial or Stayman Winesap apples during storage nor did it affect the firmness of the fruit or increase its wilting.
125. SNYDER, J. C. 632.95: 634.11+634.13
Spray residue removal from apples and pears.
Ext. Serv. Bull. Wash. St. Coll. Agric. 272, 1941, pp. 7, bibl. 8.
Practical hints, using hydrochloric acid and sodium silicate.
126. O'KANE, W. C., GLOVER, L. C., AND BLICKLE, R. L. 632.951
An insect toximeter. Studies of contact insecticides XV.
Tech. Bull. N. Hamp. agric. Exp. Stat. 76, 1941, pp. 10.
A very clearly illustrated account of an insect toximeter, which shows many improvements on an older model used for some years with a fair degree of success at the New Hampshire Station. The new model by the elaboration of the turn-table idea used previously allows of more uniform application of technique.

127. ANON. 632.951
Economic value of plants.
Rhod. agric. J., 1942, 29: 412-3.
The kernels of the yellow flowered poisonous shrub, *Thevetia nerifolia*, often grown as an ornamental plant in S. Rhodesia, contain a powerful insecticide, especially against aphids. The kernels are ground, soaked in water for 24 hours, filtered and a little soft soap added to the filtrate. It is used at a concentration of $\frac{1}{4}$ to $\frac{1}{2}$ oz. of kernel per gal. water.
128. DANCATER, E. A. 632.954
Catalysts for sodium chlorate in weed destruction.
Nature, 1942, 150: 737-8, bibl. 1.
Laboratory and field tests are described which show that compounds of manganese, cobalt and nickel, as well as vanadium pentoxide have an intensifying effect upon sodium chlorate as a weed killer. Experiments were carried out on various brambles and the dog rose, the bases of their cut stems being inserted in tubes of weed killer solution. Different strains of the same species showed marked differences in resistance. The resistant specimens were all (within the species) similar to each other in appearance but differed from the remaining and susceptible stems.
129. ROSENFELS, R. S., AND CRAFTS, A. S. 632.954
Chlorate distribution and the effect of nitrate concentration on chlorate toxicity in soil columns.
Hilgardia, 1941, 14: 71-9, bibl. 8.
HAGAN, R. M. 632.954
Movement of carbon disulfide vapor in soils.
Hilgardia, 1941, 14: 83-118, bibl. 29.
A promising herbicide for deep-rooted perennials.
DAINTON, B. H. 632.64: 612.014.44
Effect of air currents, light, humidity and temperature on slugs.
Nature, 1943, 151: 25, bibl. 4.

VEGETABLES, DRUGS AND STIMULANTS.

130. BOSWELL, V. R., AND JONES, H. A. 551.5: 635.1/7
Climate and vegetable crops.
Yearb. Agric. U.S. Dep. Agric. 1941, pp. 373-99, bibl. 32.
A rough grouping is made of the 30 vegetable crops commercially important in the U.S.A. as follows:—A. Distinctly cool-region crops that prefer 60° to 65° F. and are intolerant of high summer temperatures (above a monthly mean of 70 to 75°). 1. Very hardy crops that normally meet frost conditions in the field without injury, (a) cabbage and related plants, (b) spinach and beets (c) parsnip. 2. Cool-season crops usually damaged by frost, (a) cauliflower and heading broccoli, (b) lettuce, (c) carrots and celery, (d) peas, (e) potatoes. B. Crops adapted to a wide range of temperatures but not tolerant of freezing. 1. Crops adapted to monthly means of 55° to 75° F. and tolerant of frost under certain conditions, namely onions, garlic, leeks, shallots. 2. Crops adapted to monthly means of 65° to 80° F. but not tolerant of frost or prolonged exposure near freezing point, (a) muskmelons, cucumbers, squash, (b) beans, (c) tomatoes and some peppers, (d) sweet corn. C. Distinctly warm-region, long-season crops intolerant of cold which will not thrive below a mean of about 70° F. (a) watermelons, (b) sweet potatoes, (c) eggplant and certain peppers, (d) okra. D. Perennial crops, (a) asparagus, (b) globe artichoke, (c) rhubarb. Their climatic requirements are considered in detail.
131. BRANDES, E. W., AND COONS, G. H. 551.5: 633.61 + 633.63
Climatic relations of sugar cane and sugar beet.
Yearb. Agric. U.S. Dep. Agric. 1941, pp. 421-38, bibl. 13.
GARNER, W. W. 551.5: 633.71
Climate and tobacco.
Yearb. Agric. U.S. Dep. Agric. 1941, pp. 364-72, bibl. 5.
132. BOSWELL, V. R., AND OTHERS. 635.64
Descriptions of types of principal American varieties of tomatoes.
Misc. Publ. U.S. Dep. Agric. 160, 1933, pp. 23, page plates 31, 50 cents.
BOSWELL, V. R., AND OTHERS. 635.34
Descriptions of types of principal American varieties of cabbage.
Misc. Publ. U.S. Dep. Agric. 169, 1934, pp. 22, bibl. 3, page plates 18, 40 cents.
- SHOEMAKER, D. N., AND DELWICHE, E. J. 635.656
Descriptions of types of principal American varieties of garden peas.
Misc. Publ. U.S. Dep. Agric. 170, 1934, pp. 34, page plates 6, 45 cents.
MAGRUDER, R., AND OTHERS. 635.41
Descriptions of types of principal American varieties of spinach.
Misc. Publ. U.S. Dep. Agric. 316, 1938, pp. 59, page plates 28, 25 cents.
MAGRUDER, R., AND OTHERS. 635.13
Descriptions of types of principal American varieties of orange-fleshed carrots.
Misc. Publ. U.S. Dep. Agric. 361, 1940, pp. 46, bibl. 7, page plates 22, 20 cents.
MAGRUDER, R., AND OTHERS. 635.11
Descriptions of types of principal American varieties of red garden beets.
Misc. Publ. U.S. Dep. Agric. 374, 1940, pp. 59, bibl. 30, page plates 30, 35 cents.
MAGRUDER, R., AND OTHERS. 635.26
Descriptions of types of principal American varieties of onions.
Misc. Publ. U.S. Dep. Agric. 435, 1941, pp. 87, bibl. 80, page plate 29, 50 cents.
- In these useful publications those varieties or types of the different vegetables are described and illustrated which, generally speaking, constitute 85 to 95% of the total vegetables grown from seed in the U.S.A. according to reports submitted by leading seedsmen throughout the country. They include 9 tomato, 18 pea, 9 cabbage, 10 spinach, 8 carrot, 8 beet and 21 onion varieties or types. The effect of environment on growth is considered in all cases except that of peas, and notes are included as to how the types and varieties have become established. The greater part of the text is in all cases devoted to descriptions of varieties which are immensely helped by the illustrations both coloured and plain.
133. TALLARICO, G. 631.531
L'Italia centro mediterraneo di diffusione delle sementi elette. (Italy as a mediterranean source of selected seed.)
Ital. agric., 1942, 79: 455-64.
A paean in honour of the opportunity afforded to Italy by her climatic conditions to become the chief seed producer of Europe for agricultural and horticultural crops.

134. TOOLE, E. H. 635.1/7: 631.531.16

Storage of vegetable seeds.

Leaflet U.S. Dep. Agric. 220, 1942, pp. 8, bibl. 2.

A brief summary of what has been learned from trials conducted by the U.S. Division of Fruit and Vegetable Crops and Diseases on the factors influencing the viability of seeds during storage. The following recommendations are made with regard to storage temperatures and humidities: (1) For seeds exposed to a temperature of 80 F. for more than a few days the relative humidity of air should be no higher than 45 per cent. (2) For seeds exposed to 70° F. the relative humidity of air should be no higher than 60 per cent. (3) Very short-lived seeds, such as onion and shelled peanut, old seed, or seed contaminated by fungi should be kept at a lower humidity than is recommended above. (4) For seeds in cold storage at 40° to 50° F. the relative humidity of air should be no higher than 70 per cent. and preferably should not be above 50 per cent. (5) Seeds removed from cold storage at a humidity above 50 per cent. should be dried to a moisture content safe for the temperature of later exposure, unless they are to be planted within a few days. [From author's summary.]

135. CRANE, M. B., AND THOMAS, P. T. 635.34/36: 631.531

Growing brassicas for seed.

Gdnrs' Chron., 1942, 112: 140.

An examination of the chromosomes of many brassicas, particularly kales, has revealed that they fall into 3 groups with 18, 20 and 38 chromosomes respectively. Groups with the same number of chromosomes are likely to intercross if not planted a considerable distance apart. With two varieties of the same group planted side by side in the field, 18% of the seedlings at the margins were hybrids, the percentage diminishing with distance to 1% at 30 yards, beyond which there was no perceptible fall. Kales fall into two chromosome groups, namely, 18 and 38. A table is given showing the grouping of the various brassica forms. From this can be determined what varieties required for seed can be safely planted in proximity.

136. GRIFFITHS, A. E., AND FINCH, A. H. 631.531:635.1/7 + 633.8

One year's trial on the production of vegetable seeds and the growth of herbs and related plants in Arizona.

Mim. Rep. Ariz. agric. exp. Stat. (? unnumbered), 1941, pp. 7.

Another season's results on the production of vegetable and herb seeds in Arizona.

Mim. Rep. Ariz. agric. Exp. Stat. 48, 1942, pp. 15

Both these reports deal more with the actual results achieved than with cultural practice, though a certain amount of detail is given on sowing and on time of bloom. The necessity for a chilling period in the case of caraway and one or two other plants is noted.

137. WATKINS, W. R. 635.13: 631.531

Carrot seed production. Experience at Leeton Experimental Farm [New South Wales].

Agric. Gaz. N.S.W., 1942, 53: 459-61.

Roots were hand planted 18 in. apart in the sides of a furrow the crown just below the furrow ridge, and covered immediately by means of a single furrow mold board plough which left a furrow alongside for immediate irrigation. Superphosphate, 4 cwt. per acre, had been previously hand placed in the planting furrow. Only 2 cultivations and 2 irrigations were required. Flowering began 2 months later and continued for about 6 months. The largest amount and cleanest seed was carried by the first formed umbels, seed setting becoming progressively less as time went on. The first picking was taken about 4 months after planting and 5 pickings in all were made, the later pickings showing a very high ratio of waste to clean seed. At maturity the seed in the umbels is dark grey. It does not

shatter. Implements for picking consisted of hand secateurs, canvas picking bags and chaff bags for final bagging for transport. Drying was carried out on a concrete floor in a shed, the umbels being turned daily by forking to prevent heating. Threshing and cleaning had to be done with improvised farm machinery. Subsequent sowing produced a high percentage of germination. The yield from this experiment was at the rate of 450 lb. per acre of commercially clean seed. The article concludes with a useful summary of observations and recommendations and a note of overseas harvesting methods. The latter differ in many respects from those used of necessity in this first small scale experiment.

138. FRASER, J. G. C., KALBFLEISCH, W., AND ARMSTRONG, J. M. 631.561.2

New miniature thresher.

Sci. Agric., 1942, 23: 183-6.

A simple miniature thresher for dealing with small quantities of seeds from experimental plots has been constructed at the Central Experimental Farm, Ottawa. It is described and illustrated.

139. PORTER, R. H., AND LEGGATT, C. W. 631.531

A new concept of pure seed as applied to seed technology.

Sci. Agric., 1942, 23: 80-103, bibl. 25.

U.S. DEPARTMENT OF AGRICULTURE.

351.823.1: 631.531

Rules and regulations under the Federal Seed Act of August 9, 1939 [effective Feb. 23, 1942] being Service and Regulatory Announcements 156, 1940, pp. 41 and Amendments thereto Aug. 1 and Aug. 6, 1941.

140. SCHMUCK, A. A., AND BORODINA, A. 615.783.22

Alkaloids of various plant species within the genus *Nicotiana*

C.R. Acad. Sci. U.R.S.S., 1941, 32: 62-5, bibl. 7.

The authors describe their technique for studying the alkaloid components of 42 species of *Nicotiana* of various origin, all grown on an experimental plot of the Institute for Genetics of the Academy of Sciences, U.S.S.R. It was possible to divide all the plants into 4 groups, (1) species in which nicotine is the most important alkaloid, (2) species where nor nicotine is most important, (3) species in which nicotine and nor nicotine are both equally important and (4) species whose main alkaloid is anabasine.

141. SMITH, H. H., AND SMITH, C. R. 615.783.22

Alkaloids in certain species and interspecific hybrids of *Nicotiana*.

J. agric. Res., 1942, 65: 347-59.

Examinations made with a view to determining the possibility of using *Nicotiana* species or hybrids thereof as a source of nicotine, anabasine and nor nicotine.

142. REVUE HORTICOLE. 631.544

Mesures à prendre en temps de restrictions pour les cultures de serres. (Measures to be taken to protect glass house plants during fuel restriction.) [A symposium.]

Rev. hort., 1940, 27: 142-6.

A number of prominent French professional horticulturists make suggestions for the wintering of greenhouse plants when fuel is restricted. Plants should be started into growth as early as possible in spring so that they can be ripened off early. Large plants should not be repotted but fed rather more than customary. Repotting of young plants should be delayed till warm weather. Watering should be gradually decreased early in autumn. Evergreens should be deprived of their more tender shoots or even cut back to a few leaves only. Small palms should be deprived of their outer leaves and the inner leaves tied

together in bundles and supported by a stake. The trunks of large palms should be wrapped in packing and their heads enclosed in a lattice frame covered lightly with brushwood, etc. Treated thus they will endure temperatures down to +5° C. Frames may be protected by thick coverings of moss or dry leaves, etc., on the lights and round the plants within. Tanks for aquatic plants may be emptied, filled with specimen or other pot plants and covered with planks. The stock of the dispossessed aquatics can be maintained by potting small pieces and keeping them in small receptacles of water where there is some warmth. All glasshouses should be covered with exterior lattice blinds. These maintain 2-3° additional warmth, act as camouflage from the air and provide good protection from bomb blast.

143. BROWN, C. A. C., AND GOLDING, E. W. 631.544: 631.588.1

Simplified electrically heated hotbeds.

Tech. Rep. British Electrical and Allied Industries Res. Ass. Ref. W/T7, 1942, pp. 24, 1s.

A method whereby lettuce of first rate quality can be economically produced at a cost considerably below retail shop prices in different parts of England and Scotland from mid-March onwards is here described. Essentially it consists in equipping a frame with a soil-heating cable or with a transformer-fed bare iron wire to give a loading of 2 to 5 watts per square foot. Heating is controlled from a convenient point indoors, whence the supply is taken, to give regular doses of heat in each 24 hour period. These doses vary from 40 to 45 watt-hours per square foot per day, depending on the district. Other crops can also be raised, either simultaneously, such as carrots, or in succession. Details of practical value are given in 9 appendices: (1) *Summary of records.* Some 22 frames were used in 1941 and 38 in 1942, many of the users being amateur gardeners. From a standard frame of 50 plants an average net return of 46-15 heads could be expected. Cropping had started by March 31st in 33-3% of the frames, by 15 April in another 50%, and before April 30 in 15%. (2) *Installation, preparation and control of hotbeds.* Details are given of the electrical installation and wiring necessary, using heating cable or transformers; of making up the bed; of planting; of heat control; and of the preparation of the bed in subsequent years. (3) *Notes on horticultural procedure.* These concern choice of variety; raising of seedlings; drainage and exposure of frames, the soil used and heat insulation; planting out into frames and care of growing plants; crop succession—lettuce, carrot, mustard and cress, turnip, shallots, self-blanching celery, cauliflower, beetroot, dwarf beans, cucumber, melon, and tomato all lend themselves to such cultivation. (4) *The provision of frames.* Lights 4 ft. × 3 ft. or 5 ft. × 3 ft. are better than 6 ft. × 4 ft. Hints are given on dimensions and manufacture. (5) *Causes of failure.* Among those noted were:—deficiency of organic matter coupled with excess of mineral phosphates and potash; waterlogging; bad mechanical (unsettled) condition of soil; poverty of soil; excessively cold (north-east) aspect; failure of heating. (6) *Notes on electrical loadings.* (7) *The relative advantages of transformers and bare wire.* (8) *Notes on commercial application,* i.e. not merely to supply oneself cheaply but to grow for sale. (9) *National aspect.*

144. ANON. 631.544: 632.9
Glasshouse demonstration at Kenilworth.
Gdnrs' Chron., 1943, 113: 18.

The demonstrations included washing down a greenhouse with cresylic acid (actually owing to short supply, the proprietary preparation Tarbol was used), steam soil sterilization, chemical soil sterilization with formaldehyde and by carbon bi-sulphide injection, the control of *Cladosporium fulvum* by means of the Campbell sulphur vaporizer and of white fly by hydrocyanic acid gas, using phosphoric acid instead of sulphuric acid, thus reducing risk of foliage

injury, and the operation of the Jones sterilization tank. The account of these operations is usefully annotated.

145. CARTER-LEE, W. 632.76: 631.544
Wireworm in glasshouses.
Fruitgrower, 1942, 94: 262, 266, 297, 338, 342.

Wireworm in glasshouses can be satisfactorily controlled by the injection of neat carbon disulphide at the rate of about 1 gal. per 500 sq. ft., or ½ oz. at distances of 15 inches in each direction. Dosage and number of injections to a given area vary with the nature of the soil, compact soils requiring smaller dosages at closer intervals. The question of dosage is fully discussed as is the depth of injection which may vary according to circumstances from 5 to 11 inches. In addition to exterminating wireworm CS₂ provides protection against reinfestation over a relatively long period. Imported soil and turf, a frequent source of wireworm and leather jackets, can also be purged in this way. Growth in treated soil is not impaired but, if anything, improved.

146. ANON. 633.491-1.531
Investigation on South American potatoes.

J. Coun. sci. industr. Res. Aust., 1942, 15: 254-5.

Preliminary selection and breeding work with some 1,400 strains or varieties of South American potato specimens brought to England from the Andes in 1939 will be concentrated at Cambridge, England.

147. SHEFFIELD, F. M. L. 633.491: 575
The "blotches" on leaves of Arran Pilot potatoes.

Ann. appl. Biol., 1942, 29: 341-5, bibl. 3.

A greyish green blotch appearing on some leaves of Arran Pilot potato was examined and is described. It is almost certainly of genetic origin. It is discussed in comparison with other plant effects which resemble it in one or other of its characters. [From author's summary.]

148. RAMSEY, J. T. 633.491
More potatoes are needed. Advice on growing.
J. Dep. Agric. Vict., 1942, 40: 393-9.

Some of the items which are dealt with very thoroughly are preparatory cultivation, cutting potatoes for seed, manuring, planting depth, spacing, tilling and storing. Close planting is emphatically recommended, i.e. 14 inches apart in the rows for early and 16 inches apart for late varieties. Close planted tubers are more uniform in size and shape and more attractive for marketing purposes.

149. ANON. 633.491-1.532.2
Breaking the dormancy of potatoes.

J. Coun. sci. industr. Res. Aust., 1942, 15: 253.

Full technical details of a cheap method of breaking dormancy in potatoes will be published later. This note gives rough details of technique. Briefly the potatoes are kept in acetylene solution for 4-5 hours, 8 oz. of commercial calcium carbide producing enough acetylene to saturate 11 gal. water, which suffices to treat 1 cwt. of potatoes at a time in a container of approx. 16 gal. capacity. The potatoes must be whole at treatment, since if cut just before or after treatment they will rot. If the tubers have to be treated for the control of rhizoctonia, acid mercuric chloride should be used before the acetylene.

150. ELLIS, N. K. 633.491-1.532.2
A comparison of stands and yields from seed pieces cut from the apical and stem ends of Irish Cobbler, Russet Rural and Chippewa potatoes.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 516-8, bibl. 2.

Trials from Indiana indicate that there may be a difference between potato varieties in their reaction to apical dominance of seed pieces. In Cobbler there was but little difference in yield from apical end and stem end pieces, but in Chippewa the apical end pieces yielded very much better than the stem pieces.

151. COWIE, G. A. 633.491-2.19
Factors inducing mineral-deficiency symptoms on the potato plant.
Ann. appl. Biol., 1942, 29: 333-40, bibl. 11.
The data are based upon observations from 24 replicated manurial trials on the potato crop in 1937, and 25 further trials of a different design in 1938. Leaf scorch and other potash deficiency symptoms on the aerial part of the plant are normally induced by NP and not by N treatment. Leaf scorch on the N plots was frequently correlated with a high level of available phosphates in the soil. Increasing N in the NP treatment resulted in intensification of K deficiency symptoms. Blackening of cooked tubers was found to result from a combination of high N with low K in the soil. Phosphate deficiency is induced by N and more strongly by NK treatments. P and not K deficiency symptoms were shown by the N plants under conditions of low P and low K in the soil. Calcium deficiency symptoms appeared on poor sandy soils with pH between 4.5 and 5. Magnesia deficiency was not detected and in only 1 case in each year was there a significant yield response to magnesia.
152. SANDFORD, G. B. 633.491-2.19
Apical leaf speck of potatoes.
Sci. Agric., 1942, 22: 772-4, bibl. 3.
Preliminary report on a supposed nutritional malady of potatoes in Alberta.
153. BAWDEN, F. C. 633.491-2.8
Potato virus disease.
Nature, 1942, 150: 476-7.
Of the 20 known viruses that affect potato, leaf roll, potato Y and potato X are the most injurious in Great Britain. These and their vectors are discussed with special reference to the results of recent work by a number of investigators who are named. The article will be useful to readers desiring a survey of the present potato virus position.
154. STONE, W. E. 632.8: 633.491 + 634.7
Effects of some mild forms of mosaic on potato and a few other plants.
J. agric. Res., 1942, 65: 195-207, bibl. 23.
Other plants are raspberry, blackberry and groundcherry (*Physalis*).
155. BONDE, R., AND OTHERS. 633.491-2.3
Resistance of certain potato varieties and seedling progenies to ring rot.
Phytopathology, 1942, 32: 813-9, bibl. 3.
Resistance to ring rot (*Phytophthora sepe-donica*) was shown by very few out of a great number of potato varieties and unnamed seedlings. Of 92 selections of a cross between the resistant British variety, President, and the susceptible Katahdin nearly half were resistant and others varied in degree of susceptibility. A few selections from a cross between the susceptible varieties were more resistant than either parent. It should not prove difficult to produce good commercial varieties resistant to ring rot, which is a major potato disease of U.S.A. and Canada.
156. DYKSTRA, T. P. 633.491-2.3
Compilation of results in control of potato ring rot in 1941.
Amer. Pot. J., 1942, 19: 175-96, bibl. 2.
A report based on a survey of potato ring rot (*Phytophthora sepe-donica*) in U.S.A. in 1941 by a committee of the American Potato Association. Mercuric chloride and acidulated mercuric chloride solutions were highly effective and iodine only slightly less so in disinfecting cutting knives. Corrosive sublimate 1:500 gave best results in controlling spread of ring rot between infected and healthy seed pieces. No injury resulted from these treatments which were more effective than others tested.
157. THATCHER, F. S. 633.491-2.48
A stem-end rot of potato tubers caused by *Rhizoctonia solani*.
Phytopathology, 1942, 32: 727-30.
Pathogenicity tests suggest that *Rhizoctonia solani* can cause decay in the potato tuber unless prevented by rapid wound periderm formation.
158. HOWARD, A. 633.491-2.654.1
Eelworm disease of potatoes.
Gdnrs' Chron., 1942, 112: 197.
Potato eelworm may turn out to be a symptom of soil exhaustion. An article from *The Rhodesia Herald*, 4 September, 1942, quoted at some length, describes how both in Rhodesia and Ceylon the application of organic compost, green manure or cattle manure greatly reduced eelworm infestation of various crops. The author suggests that experiments on infected potato land should be made in Great Britain.
159. TIMSON, S. D. 633.491
The potato. Methods of cultivation in Southern Rhodesia.
Rhod. agric. J., 1942, 39: 274-95.
A revision of *Bull. Rhod. agric. Dep.* 836.
DIETZ, C. F., AND VERNER, L. 633.491: 581.144
An auxanometer for continuous recording of potato tuber growth.
Proc. Amer. Soc. hort. Sci. 1942, 1942, 40: 509-12, bibl. 3.
Diagrams show the construction.
160. ZANOTTI, M. 633.529.1
La *Broussonetia papyrifera*, L'Héritier, pianta forestale da cellulosa. (*B. papyrifera*, a possible source of cellulose.)
Ital. agric., 1942, 79: 267-71.
B. papyrifera, which comes from China and Japan, belongs to the mulberry family, *Moraceae*. It is very adaptable as regards soil and appears to like a northern slope in Italy. It forms a quickly spreading and rather superficial root system which soon covers the ground and it is thought that grown in bush form it would be excellent for checking erosion. It would moreover provide food for silkworms in its leaves which also are good fodder for both milk and meat cattle. Its chief use, however, would be as a source of cellulose and paper. It has already been found possible to produce bank note paper from the bark and in the author's opinion the whole stem should lend itself to paper making.
161. HOLLANDS, H. F., HURD, E. B., AND PUBOLS, B. H. 633.79
Economic conditions and problems of agriculture in the Yakima valley, Washington, Part IV. Hop farming.
Bull. Wash. agric. Exp. Stat. 414, 1942, pp. 39, bibl. 5.
The economic problems of hop growing in the Yakima Valley are dealt with at some length. In 1939 some 4,650 acres were devoted to hops, the actual production amounting to about 25% of the total national hop production, that of California being about the same and that of Oregon about double, the production from other States in the Union being negligible. As regards cultivation height of trellises varied from 10 to 14 feet. In most of the hop yards the hills were 7 feet apart. Pruning practice varied in its severity. Twenty-five out of twenty-seven growers attached 2 strings to each hill. Most of them trained 2 shoots per hill, a few trained 3 shoots or even 1 shoot per hill. Vines were not normally cut till after the first frost. Three growers used a rye cover crop. All

irrigated, differing in the methods used. Mechanical picking is on the increase.

162. SALMON, E. S. 633.79
Notes on hops: 1940. 1. Seedling Ref. No. OB53: the richest hop in the world. 2. July and August hops.

Publ. (out of series) S.E. agric. Coll. Wye, April 1940, pp. 1-11, bibl. 11 and pp. 12-18.

The morphological, botanical and brewing qualities of seedling hop Ref. No. OB53, raised at Wye in 1925, are discussed. Whether its very high qualities will compensate for its low yields the future will show. The name of Nonsuch Hop is proposed for it. Notes are given of certain new seedlings which are ready to harvest at the end of July and in August as against the normal ripening time of early September.

163. KEYWORTH, W. G. 633.79-2.48
Verticillium wilt of the hop (*Humulus lupulus*).
Ann. appl. Biol., 1942, 29: 246-57, bibl. 7.

The paper deals with the author's work on *Verticillium* wilt of hops in Kent begun in 1938. The life histories of the causal fungi, *V. albo-atrum* and to a less extent *V. dahliae*, are described. They attack the hops from the soil through the roots and for this reason are difficult to eradicate, especially since the hop is perennial. The principal methods of checking the disease consist of certain hygienic measures. No bine from affected fields should be used as manure for hops nor should cuttings be taken from anywhere in the vicinity of affected plants. Hops should not be planted after potatoes or raspberries, both of which can carry the disease without it being very noticeable. Where large numbers of wilted hops have been removed the ground should not be planted with potatoes or soft fruits but rather with cereals, root crops or green vegetables. Tractors should be washed with a pressure hose after a contaminated field has been visited and should visit the affected fields last. Affected vines in the progressive type of attack should be dug up and burned with all debris and the site not planted. With the fluctuating type the same precautions should be taken except that the plant need not be dug up since it may recover. Sites from which plants have been removed may be rendered safe by disinfection by 8 gall. of 2% formalin and by filling in with uninfected soil and this should be combined with a treatment of the whole area with similar solution at the same rate per sq. yard.

164. HOERNER, G. R. 633.79-2.411
A convenient scale for use in the rapid determination of comparative degrees of infection of hops by the downy mildew fungus, *Pseudoperonospora humuli*.

Phytopathology, 1942, 32: 331-3.

HOERNER, G. R. 633.79-2.411

A study of spreaders for use on hops in the field control of downy mildew.

Phytopathology, 1942, 32: 820-3, bibl. 1.

165. TING, S. V., AND BARRONS, K. C. 633.842: 581.192

A chemical test for pungency in peppers.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 504-8, bibl. 2.

A sample of the dried, ground pepper fruit is extracted with ether to get the pungent principle, capsaicin. The indicator, a 1% solution of vanadium oxytrichloride in carbon tetrachloride is added to the ether extract until no further colour change takes place. Sweet pepper extracts show no green colour reaction while those of hot peppers vary from a greenish yellow to a dark green with increasing content of capsaicin. A method is described for the preparation of a series of colour standards from malachite green and naphthol yellow.

166. COCHRAN, J. 633.842: 612.014.44
Influence of day length on the time of flower primordia differentiation in the Perfection pimiento (*Capsicum frutescens* L.).
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 493-7, bibl. 12.

In experiments in Georgia no differentiation of flower primordia occurred in pimiento under 0 to 6-hour day lengths. Under 12-hour day treatments it took place 23 days after emergence from soil, under 8- and 10-hour day treatments it took 26 days, under 14-hour day 27 days, 18-hour day 28 days and continuous daylight 31 days. Actual growth, as measured by height and green weight, varied directly with length of day, being greatest under continuous daylight conditions.

167. JANES, B. E. 633.842: 581.163
A comparison of the chemical composition of artificially produced parthenocarpic fruits and normal seeded fruits of peppers.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 432-6, bibl. 5.

Total nitrogen proved to be the only constituent other than moisture in which there was a consistent significant difference between parthenocarpic and seeded fruits of peppers. When expressed as percentage of dry weight the total nitrogen was higher in the pericarp of the parthenocarpic fruits than in the seeded ones at all stages except the 15-day-old fruits. The reasons for this and other less obvious differences are discussed.

168. KHELENIKOVA, N. A., AND MOSKOVETZ, K. G. 633.85

On the biology of *Chenopodium ambrosioides* L.
C.R. Acad. Sci. U.R.S.S., 1941, 32: 161-2.

A form of *Chenopodium ambrosioides* L. var. *anthelminticum* possessing a very high content of ascaridole refused to flower or only flowered very late, i.e. on the 146th day, when transferred from Samarkand to grow in Moscow. It was found that a reduction of day length or alternatively vernalization of the seed resulted in a shortening of the growing period by about 70 days, although similar treatment of a variety from Poznań known to flower reasonably quickly at Moscow only slightly reduced the growing period.

169. KHELENIKOVA, N. A. 633.85: 612.014.44
Growth and development of white poppy under varying daylength.

C.R. Acad. Sci. U.R.S.S., 1941, 32: 503-4, bibl. 2.

Papaver somniferum is a long day plant. In experiments recorded here on two sub-species of different origin grown at Moscow and submitted to different day lengths and nutrition the sub-species from Tarbagatai was found to be dependent on long day conditions for optimum growth, whereas that from Tian-Shan proved more plastic and capable of tolerating a short photoperiod.

170. MINISTRY OF AGRICULTURE, LONDON. (HOARE, A. H.): 633.88

The cultivation of medicinal plants.

Bull. Minist. Agric., Lond., 121, 1942, pp. 27, bibl. 11, 6d.

Some of the information given here was originally published in *Bull. 76* issued by the Ministry in 1936 (*H.A. 6: 238*). It has been revised and considerably enlarged. The information concerns almost entirely the cultivation side, and although in some cases notes are given on drying or processing of the different crops the instructions on these points are general rather than particular. The plants discussed are as follows:—Aconite (*Aconitum napellus*), angelica (*Archangelica officinalis*), aniseed (*Pimpinella anisum*), belladonna (*Atropa belladonna*), caraway (*Carum carvi*), chamomile (*Anthemis nobilis*), coriander (*Coriandrum sativum*), foxglove (*Digitalis purpurea*), dill (*Anethum graveolens*), fennel (*Foeniculum vulgare*), henbane (*Hyoscyamus niger*), lavender (*Lavandula intermedia*), lettuce

(*Lactuca virosa*), liquorice (*Glycyrrhiza glabra*), parsley (*Petroselinum crispum*), pennyroyal (*Mentha pulegium*), peppermint (*Mentha piperita*), poppy (*Papaver somniferum*), psyllium (*Plantago* spp.), pyrethrum (*Chrysanthemum cinerariifolium*), rhubarb (*Rheum* spp.), rosemary (*Rosmarinus officinalis*), squirting cucumber (*Ecballium elaterium*), stramonium or thorn apple (*Datura stramonium*), valerian (*Valeriana officinalis*).

171. HOPKINS, J. C. F. 633.88
Stramonium or stinkbiaar I. A medicinal herb required for war purposes II. Further details regarding collecting and marketing of the leaves. *Rhod. agric. J.*, 1942, 39: 350-2, 484-5.

The various kinds of stramonium, growing wild in Africa, are distinguished and illustrated. Two only, *Datura stramonium* and *D. tatula*, are of medicinal value. Both are common and should be collected wild rather than cultivated. Methods of collection to avoid mistakes are suggested. Either natives could be sent out unsupervised with transport to reap whole plants which could be sorted out on return by the farmer or a leaf by leaf collection under proper supervision could be made and would probably ensure a higher quality product. Quick drying of the leaves, in the sun if necessary, is essential. For the purpose they may be tied by the stalks in bunches of a dozen and hung along a light stick. Drying should continue until the leaf tip crumbles on being handled. Not more than 4 days is required and if a tobacco barn with a temperature of 105°-110° F. is available the time required will be even shorter. The dried leaves are packed tightly and pressed down, pressure being applied by a board and the weight of the body but not by direct trampling. If solid containers (e.g. cardboard cartons) are not available, sacks can be used. Leaves and flowering tops are acceptable, but the British Pharmacopœia does not allow more than 20% of total stem and not more than 1% of stem wider than 4 mm. (five-sixteenths of an inch).

172. HEPLER, J. R., ACKERMAN, W. T., AND FRENCH, B. 633.88.115
The potency of *Digitalis purpurea* cultivated in New Hampshire. *Proc. Amer. Soc. hort. Sci.* for 1942, 1942, 40: 557-61, bibl. 7.

The merits of different times of planting and harvesting and the problems of drying are here discussed.

173. GRUBERG, V. L. 633.913
Rubber. *Flight*, 1943, 43: 1776: 13-8.

Among rubber-producing plants whose potentialities are briefly discussed are the following:—Castilloa (*Castilloa elastica*), a native of Mexico; guayule (*Parthenium argentatum*), also from Mexico, is said to be capable of cultivation on marginal lands in California, Mexico, Texas, Arizona, and there are Axis reports that it is to be grown in Italy. The domesticated shrub in California contains 23% rubber and needs 4 years to mature. It should produce about 1,500 lb. rubber per acre in the 4th to 5th year, 2,000 lb. in the 6th year rising to a peak in the 7th year. Its quality is not quite so good as that of *Hevea*. Kok saghyz, krim saghyz and tau saghyz. Kok saghyz (*Taraxacum kok-saghyz*), the most promising, is said in Russian trials to have produced 52-88 lb. of rubber per acre in the first year. The Soviet had large plantations in Latvia. The Germans are now trying to lay out plantations in Hungary, Poland and Rumania on reclaimed moorlands. One source of material for synthetic rubber is alcohol, and here grain and potato crops afford the most promising raw material.

174. HOWES, F. N. 633.913
Russian rubber plants in Britain. *Discovery*, 1943, 4: 27-30.

Kok saghyz (*Taraxacum kok-saghyz*) was found 11 or 12 years ago in the Tian Shan mountains of the Republic of

Kazakhstan in Central Asia near the Chinese border at altitudes ranging from 6,500 to 7,500 feet. It proved adaptable to a variety of soil and climatic conditions in European Russia and was more resistant to diseases and pests than other rubber species tested. Though in its native habitat it grows in alkaline soils it has been grown on peat soil with pH as low as 5.5, under which conditions it has tended to show better growth and higher rubber content. Stratification of seed well moistened and kept at freezing point for 25-30 days prior to sowing was found to be an advantage, stratified seed germinating in 4-5 days after sowing as against 40-50 days for unstratified seed. Shallow sowing not more than ½ in. deep is essential for good germination. Delayed germination is common. Laboratory germination tests with Russian seed at Kew in the summer of 1942 averaged over 70%. Plants from August sown seed in ordinary light loam garden soil showed good development two months later. The plants looked healthy, the larger ones showing rosettes of 10-15 leaves measuring 6-8 inches across. How they will weather the damp of an English winter at Kew remains to be seen. Something had eaten back some of the young plants, but the cause is not known. The roots can be harvested at the end of the first year. In the Moscow region 5 tons of roots per hectare have been lifted from good soils with rubber content of about 4½%. In harvesting roots are dug with a modified sugar beet lifter, cleaned, have the tops removed and are then dried or partially dried if wanted for immediate processing. This consists in grinding the dried roots to powder, macerating with water or with alkaline solution and separating the rubber from the other matter by centrifuging or gravity. Examination of other possible rubber plants shows that the rubber content of the common dandelion (*T. officinale*), of *Asclepias syriaca* or American milkweed, sow-thistle (*Sonchus oleraceus*), spurge (*Euphorbia* spp.), wild lettuce (*Lactuca* spp.), *Euonymus*, *Campanula* and golden rod (*Solidago*) are all far too low in this country to support any idea of use in rubber production. Other rubber plants discussed are Tau saghyz (*Scorzonera tau-saghyz*) and krim saghyz (*Taraxacum megalorrhizon*), the Chinese guttapercha tree (*Eucommia ulmoides*) and guayule (*Parthenium argentatum*), the last named requiring a hot dry climate.

175. LOOMIS, H. F. 633.913
Castilla rubber's comeback. *Agric. Amer.*, 1942, 2: 171-6.

Hevea brasiliensis ousted *Castilla* elastica*, once popular, especially in Mexico, as a source of rubber, by reason of its higher yields and lower labour costs. *Castilla* belongs to the mulberry family and forms a large tree in the open forest or on the margins of dense jungles. The rubber produced is not so good as that from *H. brasiliensis* and it is not produced so soon after planting by some years. Its value to-day lies, not in new plantations, but in those established many years ago, as well as in the wild trees, from which production is being stimulated.

176. MITCHELL, J. H., RICE, M. A., AND RODERICK, D. B. 633.913: 581.192
Rubber analysis of plants in South Carolina. *Science*, 1942, 95: 624-5.

Some 34 species of plants growing in the vicinity of Clemson Agricultural College were analysed for rubber content. Of the percentages tabulated the berries of a *Smilax* sp. had the highest content (3.65%) though two other samples of the same variety were less productive (1.85% and 2.05%).

177. ANON. 635.1/7
Food from the garden. *Growmore Bull. Minist. Agric., Lond.*, 1 (3rd edit.), 1942, pp. 15, 3d.

Complete instructions are given on the best method of cultivating the home garden to ensure maximum vegetable

* Also known as *Castilloa*.

production. Notes are given on soil preparation, manuring including management of compost heap, cropping layout, suitable varieties, etc.

178. TIEDJENS, V. A., AND SCHERMERHORN, L. G. 635.1/7: 631.8

Growing vegetables with fertilizer in water.

Bull. N. Jer. agric. Exp. Stat. 694, 1942, pp. 20.

Trials during the last 10 years indicate that fertilizer can be applied more profitably in water than in dry form. Yields of tomatoes, sweet potatoes, beans, celery and peppers were increased by the use of liquid fertilizer as starter solutions for setting plants and sowing seeds. Later applications in water as side dressing also proved very successful. It is suggested that the superiority of the wet to the dry method may have been due to the greater availability of phosphoric acid under the wet method and the absence of injury due to contact with dry fertilizer.

179. HASKELL, R. J., AND BOSWELL, V. R. 635.1/7: 631.521.6

Disease-resistant varieties of vegetables for the home garden.

Leaflet U.S. Dep. Agric. 203, 1940 pp. 8.

The briefest of notes are given on the chief diseases of common garden vegetables and suggestions are made in most cases of varieties which have shown resistance.

180. DURIVAUT, G. 635.1/7

Un legume à remettre en honneur; l'anserine amarante (*Chenopodium amaranticolor*). (A vegetable deserving of re-establishment.)

Rev. hort., 1941, 113: 471-2.

By way of varying the wartime menu it is suggested that a species of goosefoot, *Chenopodium amaranticolor*, should be grown. The plant is a half hardy annual and is treated accordingly, i.e. sown under glass in April and planted out in May, 60 cm. apart. When the plant has grown sufficiently the tops of the young shoots can be picked and cooked like spinach. The flavour is said to be excellent. The plants continue to give edible shoots until frost. Seed can be obtained annually from plants sown early and grown on for the purpose.

181. HOWARD, A. 635.1/7: 631.516

How solar energy is wasted.

Gdnrs' Chron., 1943, 113: 6.

All surface cultivation in vegetable gardens should stop at the end of July. The weeds will absorb the soluble salts left in the soil and immobilize them in the form of easily decomposed vegetable matter from winter leaching. The drying of the surface soil by moisture absorption and the removal of food material helps the crop to ripen. The weeds dug into the soil before the end of the year are readily converted by soil organisms into humus which becomes mineralized in time for the crop next spring. The system is in force at Levens Hall, Westmoreland, a garden noted for its successful cropping.

182. ASHMORE, S. 631.516

The question of hoeing.

Gdnrs' Chron., 1943, 113: 8-9.

A review of recent arguments.

183. PETHYBRIDGE, F. R., WRIGHT, D. W., AND DAVIES, P. G. 635.13: 632.77

Investigations on the biology and control of the carrot fly (*Psila rosae* F.).

Ann. appl. Biol., 1942, 29: 380-92, bibl. 4.

Attempts to control with derris dust the first generation of carrot fly on early carrots in Cambridgeshire were not successful. The second generation of flies were killed in large numbers by spraying the dikesides and headlands where they abounded with a poison bait consisting of 0.8% sodium fluoride and 2.5% cane molasses in water.

In small experiments grass cuttings spaced along the row with and without 4% calomel dust gave some control. Carrots sown from April to late June were attacked, after this date the attack progressively decreased. No decrease in infestation resulted from sowing onions with carrots. Deterioration in clamp from maggot attack was less extensive than in unplanted carrots. The flies feed on the flowers of chervil, *Anthriscus sylvestris*, and wild hemlock (*Conium maculatum*), and the larvae mine the taproots of the latter.

184. FRY, J. M. 581.143.26.03: 635.25

Onions and vernalization.

Nature, 1942, 150: 689.

A note of an attempt to vernalize onions. Seed of two named varieties germinated at 23° C. in February 1942. Seeds in which the radicles were just emerging (one day after soaking) were subjected to a temperature of 2° C. for three weeks and seven-eight weeks and were planted out in seed trays. They were kept in the greenhouse till mid-March and the end of April respectively and transplanted into the open on 7 May together with untreated controls germinated on 25 February and 1 April. Ten of the 37 Ailsa Craig plants vernalized for three weeks bore flowers by 21 October. In no other treatment were flower buds produced. No flowers had opened, though the bracts of three inflorescences had parted and all inflorescences were healthy at the time of writing, 24 November.

185. WELLS, S. P. 635.263

Shallots cultivation.

Fruitgrower, 1942, 94: 353-4, 357.

The shallot is generally ill-treated in cultivation. Given proper treatment the yield should be 25% greater than is commonly the case. Among the subjects discussed are the make up of the bulb, planting depth effects, cultivation points, harvesting and ripening. Briefly the bulb should be planted on the surface of the ground in February, its contractile roots will anchor it firmly; it should be fed heavily in the early stages with a balanced artificial manure or planted in soil previously well treated with farmyard manure; excess of nitrogen will lead to a soft bulb which stores badly. Bulbs should be treated gently when harvesting and ripening since it is during ripening that the physiological changes on which the future crop depends take place. The rotting of so many shallot bulbs in storage is not due to any particular pest but is primarily due to mishandling, bad ripening, bad harvesting and indifferent storage.

186. ANDERSON, H. W., THORNBERRY, H. H., AND FULTON, J. P. 635.31: 632.452

Use of eradicant sprays for the control of asparagus rust.

Phytopathology, 1942, 32: 419-23.

Pending the development of strains of asparagus resistant to rust (*Puccinia asparagi*) good control can be had by spraying with Elgetol at concentrations of 1-2% at the rate of 400-800 gal. per acre during the dormant season.

187. DENNIS, A. C. 635.34: 632.19: 546.27

Boron deficiency in members of the cabbage family.

Parsons, Lennox House, Norfolk St., London, W.C.2, 1942 (?), pp. 7.

The symptoms of boron-deficiency in the following plants are noted:—swedish turnip, swede-like rape, turnip-like rape, kohlrabi, cauliflower, cabbage, brussels sprouts, broccoli, kale, mustard, radish and one or two garden flowers. Notes are given on control of these symptoms. For control borax is generally preferred to boric acid, being of larger bulk and slightly lower cost per unit of boron. It is best not to exceed a dressing of 20 lb. borax or 13 lb. boric acid per acre. In horticultural practice it can be applied either broadcast or mixed with the fertilizer either in the row or as a side dressing. When in the row or as a

side dressing not more than 10 lb. borax should be used. The length of time before a further dressing is necessary will depend on symptoms.

188. HOPKINS, J. C. F., AND PARDY, M. H. 635.34/35: 632.8

Diseases of fruit, flowers and vegetables in Southern Rhodesia. 6. Virus diseases of cabbages and cauliflowers.

Rhod. agric. J., 1942, 39: 376-83, bibl. 8.

A prevalent mosaic virus disease of cabbages and cauliflowers in Rhodesia, transmitted by aphids, is described as is another virus disease of cauliflower transmitted by the same means. Control measures are discussed.

189. CALDWELL, J., AND PRENTICE, I. W. 635.356: 632.8

A mosaic disease of broccoli.

Ann. appl. Biol., 1942, 29: 366-73, bibl. 18.

The spread and effect of broccoli mosaic in the field.

Ann. appl. Biol., 1942, 29: 374-9.

Methods of keeping down mosaic infection of broccoli are (a) putting the seed-bed in the middle of a large field, (b) roguing early in the season. The virus is identical with Tompkins cauliflower mosaic virus and is transmitted by the cabbage aphid, *Brevicoryne brassicae*, and possibly others.

190. TODHUNTER, E. N. 635.48: 577.16

The ascorbic acid (vitamin C) content of rhubarb.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:

437-40, bibl. 8.

In trials in Washington State the ascorbic acid content of fresh rhubarb grown in the hothouse ranged from 3.5 to 5.8 milligrams per 100 grams for the Victoria variety and from 5.8 to 6.7 milligrams for the Wine variety. The field-grown product contained from 6.8 to 8.0 milligrams for the Victoria variety and 6.5 to 16.7 milligrams per 100 grams for the Wine variety. The leaf end of the rhubarb stalk was higher in ascorbic acid than the stem end. There was practically no destruction of ascorbic acid when rhubarb was cooked in a covered dish in the oven. [Author's summary.]

191. JAGGER, I. C., AND OTHERS. 635.52

The Imperial strains of lettuces.

Circ. U.S. Dep. Agric. 596, 1941, pp. 14.

The varieties of Imperial lettuce commercially grown in the U.S.A. are here discussed as also the parent varieties from which they were derived.

192. GRAY, S. G. 635.52: 581.143.26.03

Increased earliness of flowering in lettuce through vernalization.

J. Coun. sci. industr. Res. Aust., 1942, 15: 211-2.

The varieties of lettuce used in these experiments in the spring of 1941 were Imperial D and Imperial 847. Six lots of seed were used of each variety, each lot containing about 150 seeds. Three lots were germinated at once and vernalized, the other three kept and used for controls. Vernalization was accomplished by putting the seeds on moist filter paper in petri dishes on 25 August. By 26 August they had sprouted. They were then put in a refrigerator at 4°C. where they were kept for 28, 42 and 56 days respectively. Control material was raised for each lot by moistening seed on the day before the end of the refrigeration period, so that the control seedlings were apparently at about the same stage of growth as the vernalized ones when the latter were removed from the refrigerator. Moisture was added in the refrigerator as required. Imperial D seeds submitted to 56 days in the refrigerator all died during that period probably as the result of insufficient moisture. Most of the other seeds survived and were planted out. The effect of 28, 42 and 56 day treatment was to induce early bolting. The longer treatments had no greater effect than the shorter and

were in some cases deleterious. In general, treatment at 4°C. for 28 days resulted in the production of seed stalks two or three weeks earlier than the controls.

193. GRIFFITHS, A. E. 635.52: 631.531: 631.8

An experimental mechanism for the band-placing of

fertilizer in irrigated beds.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:

539-44.

An illustrated account of a combined lettuce seed driller and fertilizer distributor. Possible sources of error are discussed.

194. SMITH, J. B., AND HOWARD, F. L. 635.52: 631.45: 632.944

Response of Cos or Romaine lettuce to chloropicrin

soil treatment, phosphate, and lime.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:

552-6, bibl. 1.

Chloropicrin soil treatment at the rate of 5 c.c. per cubic foot prior to the cropping of the soil removed the major factor inhibiting vegetative growth of lettuce in pots filled with fine sandy loam soil previously under rye or rutabagas. Under the conditions of the investigation large applications of phosphate accompanying the chloropicrin treatment gave the best results.

195. LORENZ, O. A., AND MINGES, P. A. 635.52: 631.8

Nutrient absorption by a summer crop of lettuce in

Salinas Valley, California.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:

523-7, bibl. 2.

The soluble nutrients in the sap of the midrib of the wrapper leaves and the total nutrient content of the top portion of a summer crop of lettuce, at various stages of growth, were studied. The addition of 480 lb. ammonium sulphate per acre resulted in a 3-4 fold increase in the nitrate nitrogen content, i.e. from 140 to 500 parts per million, in the midrib of the wrapper leaves at market maturity over plants which had not received this fertilizer. The soluble potash content was high and remained constant throughout the season at about 4,800 parts per million. Soluble phosphorus decreased with maturity to about 150 parts per million at market maturity. The addition of phosphatic or potassic fertilizers did not affect the content. On the dry weight basis calcium and ash showed marked decreases with maturity, nitrogen a slight decrease and phosphorus and potassium no change. The entire crop at maturity of 31,662 lb. fresh weight had absorbed 47 lb. nitrogen, 7 lb. phosphorus, 117 lb. potash and 30 lb. lime per acre.

196. WOLF, E. A., AND HARTMAN, J. D. 635.611: 631.542

Plant- and fruit-pruning as a means of increasing

fruit set in musk melon breeding.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40:

415-20, bibl. 4.

The most successful fruit set was obtained by the following treatment of musk melons:—Plants were kept pruned to one main branch and two axillary branches, from which the terminal buds and all growing points were removed. At pollination all growing points, flowers and flower buds, except the flower which was pollinated, were removed. All fruits were kept pruned off the vines before the pollination.

197. BRAUN, A. E. 635.615: 632.48

Resistance of watermelon to the wilt disease.

Amer. J. Bot., 1942, 29: 683-4, bibl. 2.

More acetic acid was found in a watermelon variety less susceptible to wilt (*Fusarium oxysporum f. niveum*) than in a very susceptible variety. Whether acetic acid is the basis of resistance to wilt remains to be proved.

198. JENKINS, J. M., Jr. 635.63: 581.162.3

Natural self-pollination in cucumbers.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 411-2, bibl. 4.

Under field conditions in South Carolina in 1941, 30 to 35 per cent. of natural self-pollination was found to occur in two inbred lines of cucumber.

199. LUCKWILL, L. C. 635.64

The evolution of the cultivated tomato.

J. roy. hort. Soc., 1943, 58: 19-25, bibl. 14.

The probable stages in the evolution of the modern form of tomato fruit are discussed in relation to the history of its cultivation. *Lycopersicon esculentum* alone of the six species comprising the genus is cultivated for its fruits. This species is only truly native to the western slopes of the Andes, from northern Chile to Ecuador. The structural differences in flower and fruit between the wild form and the modern horticultural form are briefly noted. From descriptions of 16th century writers the form of the tomato was even then markedly different from the wild form and it is concluded that this must have been the result of long selection of the wild sub-species *galeni* by the natives of S. America. A table summarizes the difference between the wild, the early cultivated as introduced to Europe and the modern cultivated forms. The results of recent work on inheritance and genetics of the tomato are explained. Size of fruit is not inherited in a simple Mendelian manner but is of a multifactorial character, controlled by a number of independent genes, as also is length of inflorescence. The genes associated with large fruit have a selective advantage under conditions of cultivation but a low survival value under wild conditions. The subject is sufficiently complicated and those interested should consult MacArthur's paper.* Future lines of horticultural development are discussed. The phenomenon of hybrid vigour (heterosis) suggests the advantages, especially in commerce, of using only first generation hybrid seed from selected parents. The cross must be made every year but would be quite economical in cost and labour. The use of tetraploid lines produced by doubling the chromosomes after crossing might overcome this difficulty since tetraploid plants breed true when self-pollinated. Tetraploids can readily be produced experimentally. The vitamin C content of tetraploid tomato fruits is considerably higher than that of the parent diploid races.

200. BARROWS, K. C., AND LUCAS, H. E. 635.64: 631.523

The production of first-generation hybrid tomato seed for commercial planting.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 395-404, bibl. 13.

Experiments over a period of 4 years at East Lansing are described with illustrations of technique. It is shown that the production of hybrid tomato seed is costly and would necessitate comparatively high prices for the seed involving a retail price of say \$1 per 1,000 seeds. In view of the increases in yield which could reasonably be expected both in greenhouse and outdoor crops it should pay growers to buy and use such seed. There is no reason why growers should not produce their own hybrid seed.

201. STAIR, E. C., AND SHOWALTER, R. K. 635.64: 547.944.6

Tetraploidy in tomatoes induced by the use of colchicine.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 383-6, bibl. 5.

Tetraploidy was induced in a limited number of cases in tomato by immersing the tips of young growing plants in

* MacArthur, J., and Butler, L. Size-inheritance and geometric growth processes in the tomato fruit. *Genetics*, Vol. 23, 1938.

vials of colchicine solution and by soaking the seeds in various concentrations of colchicine in aqueous solution for various periods of time. Thus inducing tetraploidy would not appear likely to result in increased size of fruits or yield in ordinary market size tomatoes, but it might be of value for crossing certain rather distantly related species.

202. GUSTAFSON, F. G. 635.64: 581.163: 577.15.04

β -naphthoxyacetic acid as an inducer of parthenocarp in tomatoes.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 387-9, bibl. 4.

β -naphthoxyacetic acid at concentrations of 0.25%, 0.5% and 1.0% was mixed with lanolin and applied to the cut style of tomatoes. Seedless fruits were produced which were larger than seeded fruits produced by pollination. Setting was also somewhat greater than with open pollination.

203. BAUSOR, S. C. 635.64: 577.15.04

Effects of growth substances on reserve starch.

Bot. Gaz., 1942, 104: 115-21, bibl. 8.

Indoleacetic or β -naphthoxyacetic acid in lanolin caused depletion of starch in tomato cuttings kept 6 days in darkness in a mineral nutrient containing sucrose. Cuttings in media containing maltose, levulose, dextrose or lactose in place of sucrose responded in the same way to β -naphthoxyacetic or indoleacetic acid. Nitrogen-deficient plants showed similar starch depletion when treated with growth substances. Starch was deposited on the root caps of primordia which resulted from treatment with the growth substance. Digestion of starch was inhibited in these sections by aqueous solutions of 0.02% or 0.002% indoleacetic acid while depletion of starch occurred rapidly in the controls. Lower concentrations were ineffective. 0.02% indoleacetic acid in aqueous solution accelerated the hydrolysis of starch in intact stems. [From author's summary.]

204. ARNON, D. I., AND JOHNSON, C. M.

631.415: 635.64 + 635.52

Influence of hydrogen ion concentration on the growth of higher plants under controlled conditions.

Plant Physiol., 1942, 17: 525-39, bibl. 10.

A water culture method is described for the study of the effects of external hydrogen ion concentration within the range of pH 3 to 9. Profoundly adverse effects of hydrogen on hydroxyl ion concentration isolated from other variables are found only at the extremes of acidity or alkalinity. Between pH 4 and 8 fluctuations in the hydrogen ion concentration are tolerated by plants provided an adequate supply of all nutrient elements is maintained. Growth of tomato and lettuce in acid nutrient solutions at pH 4 and 5 was favourably affected by increasing the concentration of calcium in the nutrient solution. At pH 6 the growth obtained at high and low concentrations of calcium was equally favourable. The external reaction of the nutrient solution had no significant effect on the pH of the expressed sap of either shoots or roots with the possible exception of extremes unfavourable for growth. [Authors' summary.]

205. ARNON, D. I., FRATZKE, W. E., AND JOHNSON, C. M. 631.415: 635.64 + 635.52

Hydrogen ion concentration in relation to absorption of inorganic nutrients by higher plants.

Plant Physiol., 1942, 17: 515-24, bibl. 8.

Five-week-old tomato, lettuce and Bermuda grass plants previously grown under favourable conditions were placed for 96 hours in a series of nutrient solutions ranging in gradations of 1 pH unit from pH 3 to pH 9. Injury to roots from the reaction of the medium was apparent only at pH 3. At this reaction, no absorption of calcium and phosphate was in evidence. To tomato and lettuce this reaction was also wholly unsuited for the absorption of other ions. At pH 9 there was a marked decrease of phosphate absorption but no other untoward effects. Evidence was obtained of lower calcium absorption,

particularly by tomato and lettuce, from strongly acid solutions (pH 4 and 5) than at higher pH values. No profound effects of external reaction between pH 4 and 9 in the absorption of magnesium, potassium and nitrate are noted. [From authors' summary.]

206. REID, M. E., AND ROBBINS, W. J. 635.64: 581.144.2: 577.16

Synthesis of ascorbic acid in excised tomato roots.
Science, 1942, 95: 632-3, bibl. 5.

Merile cultures of excised tomato roots kept in darkness or light were found to utilize sucrose in the synthesis of ascorbic acid but no final conclusion on the effect of light on the synthesis of vitamin C by excised roots was possible from the experiments described in the paper. Although it is probable that intact plants can synthesize vitamin C at night by utilizing some of the stored carbohydrates, no gain in absolute amount of ascorbic acid per plant has been found to occur at night but rather losses of 15% to 20% have been observed. Vitamin C may play a much more important part in the economy of the plant than has been previously attributed to it.

207. WALL, R. F., AND HARTMAN, E. L. 635.64: 631.8

Sand cultures studies of the effects of various concentrations of added salts upon the composition of tomato plants.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 460-6, bibl. 16.

Experiments at Stillwater, Oklahoma, indicate that salt toxicity to tomatoes is due to the high ionic concentration, reduction in availability and/or absorption of other ions, and the effect of the induced pH. The pH toxicity exceeds the other toxic factors with NaHCO_3 ; with other salts the pH effect is subordinate. The greater the number of potential ions for equal weight concentrations of the salts used the greater is the comparative toxicity of the respective salts to tomato plants. [From authors' summary.]

208. HAMNER, C. L. 631.811.9: 635.65 + 635.64
Effects of platinum chloride on bean and tomato.

Bot. Gaz., 1942, 104: 161-6, bibl. 3.

Bean and tomato plants grown in sand culture to which a nutrient solution containing various amounts of platinum chloride had been added showed marked differences in growth associated with differences in anatomical structure, osmotic concentration of sap, rate of wilting and calcium and phosphorus content of the plants.

209. CROMWELL, B. T., AND HUNTER, J. G. 635.64: 632.19

Chlorosis of tomatoes.
Nature, 1942, 150: 606-7, bibl. 1.

A widespread chlorosis of tomatoes in the West of Scotland was investigated. The leaves immediately above the 3rd russ were most affected. The upper trusses of affected plants produced less and smaller fruit, though the flavour was unaltered. The chlorosis is attributed to inability of the plants to absorb sufficient magnesium during the extensive physiological drain imposed by heavy cropping and restrictive growth. It does not necessarily indicate a deficiency of magnesium in the soil, for the values obtained therefrom in this case were high, but root action in the case of chlorotic plants was poor, being impeded by root rot fungi, poor physical condition of the soil and low soil temperature. Observations on leaves rooted in sand watered with culture solutions of various ratios of potassium and magnesium indicated an association of the chlorotic condition with a low magnesium and a high potassium magnesium ratio. The soils in which the chlorosis appeared were subsequently found to have a very high concentration of potassium (0.1-0.3% K_2O). Soils with less potassium produced healthier plants. Chlorosis appeared on soils of very divergent pH values and it was not influenced by liming.

210. LORENZ, O. A., AND KNOTT, J. E. 635.64: 632.19

Studies of gray-wall of tomato.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 445-54, bibl. 7.

Gray-wall, a serious problem in the production of mature-green tomatoes in California, consists of a greyish cast related to the chlorophyll layer in the parenchymatous cells of the wall tissues on green tomatoes. Gray-wall fruits usually ripen so that there is no serious external evidence of the previous existence of the condition. Experiments indicate strongly that it is due to the prevailing high light intensity, hence measures tending to increase or conserve density of foliage under such conditions are recommended.

211. MAGEE, C. J., MORGAN, W. L., AND JOHNSTON, A. N. 635.64: 632.8

Control of spotted wilt of tomatoes.
J. Aust. Inst. agric. Sci., 1942, 8: 115-7, bibl. 2.

Spotted wilt of tomatoes, a virus disease carried by *Thrips tabaci* and *Frankliniella insularis*, is proving most destructive in New South Wales. The spraying of plants with tartar emetic bait applied in the form of a fine mist from a small atomizer giving 100 lb. pressure per sq. in. reduced the percentage of infected plants from 27% to 12% when sprayed once a week and to 9% when sprayed twice weekly. The difference in yield between treated and untreated plots was, however, small for reasons that are discussed, while the incidence of spotted wilt in the unsprayed plots was smaller than usual. A suggested strength is 1 oz. to 4 galls. A test during severe epidemic conditions is needed.

212. FAULKNER, R. P. 635.64: 632.48
Tomato Vetomold.

Gdnrs' Chron., 1942, 112: 184.

Records an experiment in which the new tomato Vetomold, hybrid of the Red Currant tomato and the Cheshunt strain of Potentate maintained its reputation to immunity to *Cladosporium fulvum* in a greenhouse in which the disease was deliberately introduced. All plants of other tomato varieties randomized with Vetomold became infected. In flavour Vetomold is up to the standard of commercial varieties but the fruits are too large for normal times. Now that the factor of immunity has been fixed, any disabilities should soon be removed.

213. PORTE, W. S., AND WELLMAN, F. L. 635.64: 631.521.6

Development of interspecific tomato hybrids of horticultural value and highly resistant to *Fusarium* wilt.

Circ. U.S. Dep. Agric. 584, 1941, pp. 18.

**Porte, W. S., and Walker, H. B.
The Pan America tomato, a new red variety highly resistant to *Fusarium* wilt.**

Circ. U.S. Dep. Agric. 611, 1941, pp. 6.

In the first of these circulars an account is given of the breeding work which involved crossing the very small-fruited currant tomato (*Lycopersicon pimpinellifolium*) with the common tomato. Hybridization, back crossing and selection have resulted in a combination of many of the valuable qualities of the best resistant Marglobe lines with the highly disease-resistant qualities of a particular currant line.

Among the resultant tomatoes is the Pan America, which possesses very high resistance to wilt (*Fusarium bulbigenum* var. *lycopersici*). An account is given in the second circular of its quite satisfactory horticultural growth.

214. MOORE, W. D. 635.64: 632.48
Some factors affecting the infection of tomato seedlings by *Alternaria solani*.

Phytopathology, 1942, 32: 399-403, bibl. 5.

The investigation had reference to leaf spot and stem canker of tomato seedlings grown in the south of U.S.A. for

transplanting in the north. It is shown that *Alternaria solani* only becomes serious during periods of prolonged high humidity and that if these conditions exist leaf spot incidence increases with the advance of mean temperature. Appreciable infection may develop at temperatures too low for good tomato growth. The disease is favoured by mechanical damage to foliage or stems which occurs in packing and by the high humidity that develops in the shipping crates.

215. BLIN, H. 632.76: 635.64 + 633.491
Le greffage de la tomate sur la pomme de terre comme moyen de lutte contre le doryphore.
(Grafting tomatoes on potato as a protection against Colorado beetle.)
Rev. hort., 1941, 113: 444.

Tomato grafted on potato resulted in the disappearance of the Colorado beetle which was attacking the latter. The potato yield was 2 lb. per plant and there was an adequate crop of tomatoes.

216. ROMSHE, F. A. 635.64: 632.654.1
Nematode resistance test of tomatoes.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 423, bibl. 1.

The use of *Lycopersicum peruvianum* as breeding stock for the production of nematode resistance in tomatoes appears promising.

217. NEWHALL, A. G., AND STARK, F. L., Jr. 635.64: 632.654.1
Chloropicrin and ethylene dichloride for rootknot nematode control.
Phytopathology, 1942, 32: 626-30, bibl. 10.

(1) Chloropicrin at 10-5 lb. per 1,000 sq. ft. (460 lb. per acre) applied at 10 in. intervals at 2 c.c. per injection 4-5 in. deep.
(2) Chloropicrin and ethylene dichloride 1-9 at 10 c.c. per injection 230 lb. chloropicrin + 1,594 lb. ethylene dichloride per acre. Both treatments gave excellent control of root knot nematode (*Heterodera marioni*) on a spring tomato crop in a greenhouse when applied to the soil the previous September.

218. MILLER, J. H., AND GROGAN, R. 635.64: 631.531.17
Injury to tomato seed in disinfection.
Phytopathology, 1942, 32: 524-8.

The data show that when the ratio between the quantity of tomato seed, and the volume of treating solutions, in this case Ceresan and mercuric chloride, is increased above 1 to 8 the germination of the seed is progressively impaired. The ratio 1 to 8 gave complete disinfection.

219. HAWTHORN, L. R. 635.64: 631.523
Breeding summer tomatoes for increased size.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 390-4, bibl. 5.

VAN OVERBEEK, J. 635.64: 581.144.2
Water uptake by excised root systems of the tomato due to non-osmotic forces.
Amer. J. Bot., 1942, 29: 677-83, bibl. 28.

CORDNER, H. B. 631.67: 635.67 + 635.64
The influence of irrigation water on the yield and quality of sweet corn and tomatoes with special reference to the time and number of applications.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 475-81, bibl. 3.

HARTMAN, J. D., AND STAIR, E. C. 635.64: 631.87

Experiments in plowing under coarse organic matter for tomatoes.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 471-4, bibl. 3.
Effect of organic matter on tomato yield on silt, loam nil.

- KERKIS, J. J., AND PIGULEVSKAYA, N. N. 635.64: 633.88
Interaction between *Lycopersicum esculentum* and *Datura stramonium* in the case of grafting.
C.R. Acad. Sci. U.R.S.S., 1941, 32: 505-8.

DEPARTMENT OF AGRICULTURE, NEW SOUTH WALES, BIOLOGICAL BRANCH. 635.64: 632.3/4
Tomato diseases and how to control them.
Agric. Gaz. N.S.W., 1942, 53: 380-7.
In the outdoor crop.

- FRIEDMAN, B. H., AND FRANCIS, T., Jr. 635.64: 577.15.04 + 632.3
Gall formation by *Phytophthora tumefaciens* extract and indole-3-acetic acid in cultures of tomato roots.
Phytopathology, 1942, 32: 762-72, bibl. 24.

ANDRUS, C. F., AND OTHERS. 635.64: 632.48
Collar rot (*Alternaria solani*) resistance in tomatoes.
J. agric. Res., 1942, 65: 339-46, bibl. 5.

ALEXANDER, L. J. 635.64: 632.48
A new strain of the tomato leaf-mold fungus (*Cladosporium fulvum*).
Phytopathology, 1942, 32: 901-4, bibl. 9.

HARTMAN, J. D., AND SAMSON, R. W. 635.64: 632.95
Wheel injury to tomatoes during spraying and dusting operations.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 467-70, bibl. 1.

220. DOWN, E. E., AND THAYER, J. W., Jr. 635.65
Plot technic studies with navy beans.
J. Amer. Soc. Agron., 1942, 34: 919-22.

With rows 28 inches apart a three row plot discarding the outer rows was the maximum width needed to give an accurate comparison with navy beans. The yields of one row field plots are so subject to competition that they should not be used for comparison purposes.

221. WADE, B. L. 635.653
U.S. No. 5 Refugee, a new mosaic-resistant Refugee bean.
Circ. U.S. Dep. Agric. 500, 1938, pp. 11.
Hardiness and productiveness of U.S. No. 5 Refugee snap beans.
Circ. U.S. Dep. Agric. 648, 1942, pp. 12, bibl. 6.

In the first of these circulars a detailed description is given of the characters and origin of a new, mosaic-resistant stringless bean. In the second its promise for use in the hot humid conditions of the southern United States is stressed. Apart from its shortness of pod, i.e. 5 inches, and pale green colour it has shown itself superior to older varieties in these regions.

222. THOMAS, W., MACK, W. B., AND COTTON, R. H. 635.653: 631.67: 631.8
Foliar diagnosis in relation to irrigation.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 531-5, bibl. 5.

Highly useful information on the nutrition of the plants was obtained by the analysis of a few leaves of snap beans (*Phaseolus vulgaris*) on both irrigated and unirrigated plots.

223. HUNTER, B. 635.651/654
Bean growing in Northern Idaho, Eastern Washington and Eastern Oregon.
Fmrs' Bull. U.S. Dep. Agric. 1509, 1940, pp. 15.

Instructions for the cultivation and harvesting of dry beans in the districts named.

224. MORGAN, W. L., AND PASFIELD, G. 635.65: 632.76
Dusts for protecting bean seed against *Bruchus*
(*Acanthoscelides*) *obtectus* Say.
J. Aust. Inst. agric. Sci., 1942, 8: 121-2, bibl. 1.
In the experiments recorded copper oxychloride, copper carbonate and kaolin, each 1 lb. per bushel of seed, were effective in preventing infestation of bean seed by the bean weevil in New South Wales. Copper carbonate was nearly as effective at the rates of $\frac{1}{2}$ and $\frac{1}{4}$ lb. per bushel. Sodium fluosilicate and Ceresan were effective at 2 oz. per bushel, Bentonite, talc, magnesite and hydrated lime at the rate of 1 lb. per bushel were ineffective. It is important that every seed should be well covered by dust to prevent entry by newly hatched larvae.
225. COLE, C. E., HYAM, G. N., AND READ, F. M. 635.65
Growing field beans in Victoria.
J. Dep. Agric. Vict., 1942, 40: 468-77.
All phases of cultivation and harvesting.
ROHRBAUGH, L. M. 612.014.44: 635.65
Effects of light quality on growth and mineral nutrition of bean.
Bot. Gaz., 1942, 104: 133-51, bibl. 28.
226. SOMERS, I. I., AND SHIVE, J. W. 631.811.9: 635.655
The iron-manganese relation in plant metabolism.
Plant Physiol., 1942, 17: 582-602, bibl. 20.
Experiments were carried out with soybeans in solution culture at 3 different iron levels at each of which the manganese concentrations were varied through a relatively wide range. Symptoms of iron toxicity were found to correspond to those of manganese deficiency and vice versa. The ratios of iron to manganese in the nutrient substrate corresponding to good growth of plants free from pathological symptoms fluctuated within a narrow range around 2.0 regardless of the total concentrations of these elements within the limits employed. A specific type of chlorosis was invariably produced by iron to manganese ratios above this effective range, resulting from excess iron or deficient manganese or both, and a chlorosis of a different type resulting from excess manganese or deficient iron or both. The ratios of (soluble) iron to (soluble) manganese within the tissues covered substantially the same range of values. That high concentrations of soluble manganese in the tissues are invariably associated with low concentrations of soluble iron and vice versa suggest the oxidation of ferrous to ferric ions by active manganese, resulting in the inactivation or precipitation of iron in the form of ferric organic complexes. Iron and manganese are definitely related in their metabolic functions, the biological effectiveness of the one being determined by the proportionate presence of the other. [From authors' summary.]
227. ARNOLD, H. C. 635.655
Soya beans.
Rhod. agric. J., 1942, 39: 384-90, 418-32.
Cultivation in Rhodesia.
WALLS, E. P. 635.655
Yield and quality tests of edible soybeans grown for canning in Maryland.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 441-A.
HÓDGKISS, W. S., HAGEMAN, R. H., AND MCHARGUE, J. S. 635.655: 546.27
The amount of boron absorbed by soybean plants and its effect on their growth.
Plant Physiol., 1942, 17: 652-60, bibl. 8.
228. McNEW, G. L. 635.656: 631.531.17
Growth stimulation of peas by tetrachloro-para-benzoquinone, a fungicidal seed protectant.
Science, 1942, 96: 118-9, bibl. 5.
Tetrachloro-para-benzoquinone is the first strictly organic non-metallic compound to show promise as a plant protectant against fungus diseases. Recent tests under controlled conditions with disease-free garden pea seed sown in sterilized soil in a greenhouse resulted in a production of 5-20% more dry matter in a 3 to 4 week growing period compared with untreated seed or seed treated with metallic compounds of equal fungicidal potency. None of the other fungicides increased growth and the fact that they appear to do so in the field is attributed to their prevention of post emergence seed decay and not to growth stimulation. This was borne out by experiments with seed planted in soil infected with *Pythium ultimum*. Then all the fungicides increased emergence by 23% to 25% and tetrachloro-para-benzoquinone gave the largest yield increase. The considerable fundamental significance of this discovery to the study of fungicides is pointed out, as is its great practical importance.
229. HEIM, R. 635.8
Les russules, champignons d'été. (Fungi of the genus *Russula*.)
Rev. hort., 1941, 113: 402-6.
A popular illustrated description of the genus *Russula* as found in France. A number of these fungi are edible and the simplest way of distinguishing these kinds is to chew a small fragment. Those of pleasant flavour without any subsequent nauseous taste are perfectly safe. They should be fried in butter or olive oil and are improved "by the large addition of a good pot of really thick cream" [in 1943 ?].
230. THOMAS, C. A. 635.8: 632.6/7
Mushroom insects: their biology and control.
Bull. Pa agric. Exp. Stat. 419, 1942, pp. 43, bibl. 148.
Descriptions and considerable details of life history are given with regard to the several species of flies (*Sciariidae*, *Phoridae* and *Cecidomyiidae*), springtails (*Collembola*) and mites (*Acarina*). Their prevention and control are considered in some detail. The considerable list of references should help those who want to study particular pests.
231. MACGILLIVRAY, H. H., AND DONEEN, L. D. 631.67: 635.1/7
Soil moisture conditions as related to the irrigation of truck crops on mineral soils.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 483-92, bibl. 25.
COLLINS, J. C. 633.71
Turkish tobacco, Culture and marketing in Southern Rhodesia.
Rhod. agric. J., 1942, 39: 449-76, bibl. 9.
HILLS, C. H., AND MCKINNEY, H. H. 633.71-2.8
The effect of mosaic virus infection on the protein content of susceptible and resistant strains of tobacco.
Phytopathology, 1942, 32: 857-66, bibl. 17.
JOHNSON, J., AND FULTON, R. W. 633.71-2.8
The broad ring-spot virus [of tobacco].
Phytopathology, 1942, 32: 605-12, bibl. 6.
FRAMPTON, V. L. 633.71-2.8
A quantitative method for assay of tobacco-mosaic virus protein.
Phytopathology, 1942, 32: 618-22, bibl. 2.
WOODS, M. W., AND DUBUY, H. G. 633.71-2.8
The effect of tobacco-mosaic virus on cellular respiration.
Phytopathology 1942, 32: 288-302, bibl. 22.

DIACHUN, S., VALLEAU, W. D., AND JOHNSON, E. M. 633.71-2.3
Relation of moisture to invasion of tobacco leaves by *Bacterium tabacum* and *Bacterium angulatum*.
Phytopathology, 1942, 32: 379-87, bibl. 14.
WATSON, M. A. 633.63-2.8
Sugar-beet yellows virus. A preliminary account of experiments and observations on its effect in the field.
Ann. Appl. Biol., 1942, 29: 358-65, bibl. 1.
ELLIS, N. K. 635.13
Quality in the Chantenay carrot and its relation to seed production.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 536-8.

HANNA, G. C., AND JONES, H. A. 635.31
Depth of planting studies with asparagus in California.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 498-500.
SNYDER, W. C., AND RICH, S. 635.53: 632.8
Mosaic of celery caused by the virus of alfalfa mosaic.
Phytopathology, 1942, 32: 537-9, bibl. 9.
LACHANCE, R. O., BERTRAND, P., AND PERRAULT, C. 635.53: 632.19: 546.27
Manifestation extrême de la gerçure des pétioles du celeri. (Extreme case of cracked stem of celery.) [English summary.]
Sci. Agric., 1942, 23: 187-93, bibl. 4.
Due to boron deficiency.

FLOWER GROWING.

232. HOLLEY, W. D. 612.014.44: 635.936.69
The effect of light intensity on the photosynthetic efficiency of carnation varieties.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 569-72, bibl. 2.
Trials in Michigan show that carnations respond best to light intensities of 1,500 foot-candles or more.
233. BEACH, G. 635.936.69
Carnations in various nutrient solutions and substrates.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 573-7, bibl. 5.
A single year's results in the comparison of 10 different substrates and 10 different nutrient solutions used with carnation variety Patrician at Fort Collins, Colorado.
234. STORCK, A. 635.937.17: 581.175.11
Zur Kenntnis der bei den Blütenorganen der Hortensie (*Hydrangea opuloides* Koch) den Farbumschlag von rosarot nach blau auslösenden Faktoren und Untersuchungen über den Blütenfarbstoff dieser Pflanze. (Investigations into the factors governing flower colour in hydrangea and into the colouring matter of the flowers.)
Angew. Bot., 1942, 24: 397-456, bibl. 104.
Most of the article is devoted to a description of the author's analytical work on hydrangea under varying nutritional conditions. The precise reasons for blueness or redness of flower colour still remain uncertain.

235. COCHET, C. 635.937.34
Notes sur l'origine des principales races de roses. (Note on the chief rose species.)
Rev. hort., 1942, 28: 112-4.
According to the classification of Francois Crépin (1891), which is used here, there are 56 botanical species in the genus *Rosa* of which 24 have been put to some horticultural use. Most of the present-day garden hybrids, however, spring from 7 varieties only and the blood of *Rosa gallica* will be found in nearly all of them. By 400 B.C. *R. gallica* had already produced *R. centifolia* (Cabbage Rose) and the Moss Rose, of which last there are about 50 varieties in existence. Crossed with *R. canina* (Dog Rose) it produced the Damask Rose of the Romans (*R. damascena*) and *R. damascena* × *R. semperflorens* resulted in the dwarf Bourbon types and climbers, of which the best known are Zephyrine Drouhin and Cl. Souvenir de la Malmaison. *R. gallica* × *R. indica fragrans* (Tea Rose) originated the hybrid perpetuals to the number of about 3,000 varieties. Back crosses from these with *R. indica* resulted in the hybrid teas, at present containing 1,600 varieties. The *pernetiana* race originated from a cross of hybrid perpet. *Antoine Ducher* × *R. lutea* (Austrian Briar). *R. indica* has 2,000 direct descendants. Crossed with *R. moschata* (Musk Rose) it gave rise to the 400 Noisette types and by a natural

cross with *R. multiflora* to the Polyantha forms. *R. wichuriana* has many derivatives, e.g. the rambler Dorothy Perkins. *R. bracteata* (Macartney Rose) has produced the large flowered single yellow climber Mermaid and 20 others, while of *R. rugosa* there are 100 varieties in cultivation. The remainder of the article discusses the cytology of roses.

236. I. HARRISON, J. W. H., BLACKBURN, K. B., BOLTON, E. 635.937.34: 577.16
II. MELVILLE, R., PYKE, M.
III. DARLINGTON, C. D.
Vitamin C and chromosome number in *Rosa*.
Nature, 1942, 150: 574-5, bibl. 6.

The authors of I criticize Darlington's deduction that there is a correlation between polyploidy and vitamin C content in *Rosa* (*Ibidem*, 150: 404; *H.A.*, 12: 1452). The authors of II state that (1) polyploidy in *Rosa* is one of the correlations with high vitamin C content of rose hips, others being (2) latitude, the vitamin C content increasing with a high degree of regularity from south to north for the same species, (3) with time of ripening, species ripening early in August in the London area are richer than those ripening there earlier or later, (4) with taxonomy, species placed together in the accepted classification of the genus being generally similar in vitamin C content (being evidence, too, that the classification is "natural" in the evolutionary sense). In III Darlington briefly refers to I and II and points out that a more difficult question is how the vitamin content comes to be related to increase in chromosome number. Is it a direct and inherent correlation or is it because of the historical accident that the higher polyploids have followed the retreating ice farther north and so have adapted themselves to setting seed during a longer day, so that it is with the length of day that vitamin C content is directly and inherently correlated? These questions suggest a number of experiments that should be made.

237. WARNE, L. G. G., AND FOTHERGILL, L. 635.937.34: 581.144.2

Root regeneration in some rose stocks.
J. roy. hort. Soc., 1942, 67: 396-9.

The material used consisted of ten 2-year-old plants of rose stocks known commercially as kokulensky, multiflora, laxa, Brog's canina, polmeriana and a few rugosa planted later. Before potting in 6-inch pots in January the plants were pruned to 3 shoots of 2 buds each and all main lateral roots removed except that which appeared to be a continuation of the shoot. The pot plants were kept under glass in a temperate house. The compost consisted of 1 part loam to 3 parts sand. A further set was planted out of doors in heavy soil. Polmeriana and laxa showed very rapid root regeneration indoors but were less successful outside. All the outdoor roses showed small rootgrowth but sufficient in relation to the size of the bushes. It would seem that not only do stocks differ in their ability to regenerate roots

out that they react differently to changes in environment. Indoors multiflora began budgrowth before root development had started and most of these shoots withered; out of doors it behaved normally. Rugosa was slow in regeneration in both environments. In an experiment in which multiflora and polimeriana were worked with Etoile de Hollande root production was more rapid than with unworked stocks to start with, but by July had become less with the worked than with the unworked bushes. Multiflora did not induce in the scion the premature root break which characterized its own shoots.

238. MARTH, P. C. 635.937.34: 577.15.04
Effects of growth-regulating substances on shoot development of roses during common storage.
Bot. Gaz., 1942, 104: 26-49, bibl. 18.

Nursery roses dug up and stored for the winter in common storage in U.S.A. are apt to start into premature growth while still in storage. Trials made with 17 chemical compounds on 4,400 rose bushes indicated that 3 compounds, naphthalenemethylacetate, naphthalenethylacetate and naphthalenecetonitrile effectively inhibited bud growth for 40-60 days in common storage. The concentration was 0.01% in 0.25% wax emulsion sprays applied to plant tops or as vapours to dormant plants at the rate of 0.3 and 0.4 g. per 1,000 cu. f. Vapour of naphthalenemethylacetate at the rate of 0.3 g. per 1,000 cu. f. was equally effective when applied at 32° F. for 16 hours, 40° F. for 4 hours or 70° F. for 1 hour. Concentrations of this vapour above 0.5 g. per 1,000 cu. f. caused cane injury while a lower concentration than 1 g. per 1,000 cu. f. increased the number of shoots developing in storage. Mould growth was inhibited. The conservation of starch brought about by the treatment resulted in greatly increased root and top growth and more and better quality flowers when replanted.

239. BAKER, K. F., AND THOMAS, H. E. 635.937.34: 632.8
The effect of temperature on symptom expression of a rose mosaic.
Phytopathology, 1942, 32: 321-6, bibl. 10.

Symptoms of mosaic on Peerless and Rome Glory roses in commercial greenhouses were favoured by temperatures of 15-25° C. and greatly reduced in severity only below 15° C. Thus it should be possible to grow satisfactory budwood under glasshouse conditions where diseased plants can be recognized and eliminated and where the danger of new infection is slight. [From authors' summary.]

240. RATSEK, J. C. 635.937.34: 631.542
The effect of pruning established rose bushes on bloom production.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 562-4, bibl. 1.
RATSEK, J. C. 635.937.34: 631.811.7
The effect of sulphur on growth of roses in an alkaline soil. II. Results for 1940 and 1941.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 565-8, bibl. 4.
Continuation of article *ibidem*, 37: 973-7.

241. LITTLE, T. M. 635.939.516: 575.243
Tetraploidy in *Antirrhinum majus* induced by sanguinarine hydrochloride.
Science, 1942, 96: 188-9.

In December 1941 [apparently at Beltsville, Md] 100 seedlings of antirrhinum were treated by placing a drop of 0.2% sanguinarine hydrochloride on the terminal growing point of each. Controls consisted of 100 plants treated with 0.2% colchicine, 100 with 0.2% lycorine and 100 plants untreated. The toxic effect of the sanguinarine was quickly evident in dead tissue where the drop had been applied. Seedling growth was at first retarded but later recovered. Eighteen plants were selected as showing abnormal growth. Nine of these were lost owing to faulty handling. Of the rest 5 were found to be tetraploids and 4 diploids. No

tetraploids were found among the untreated plants or those treated with lycorine. Four appeared in those treated with colchicine, though it is noted that a much higher percentage of tetraploidy has been induced by colchicine by repetition 3 or 4 times at 3-day intervals of the above treatment. Preliminary experiments indicate that the effect of sanguinarine on mitosis in excised tips of *Lilium* is similar to that of colchicine in producing shortened and split "C-chromosomes". A more detailed account of these studies is promised later.

242. HASTINGS, R. J. 635.944: 632.654.1
Longevity of congelations of bulb nematode, *Diitylenchus dipsaci* (Kuhn) Filipjev, from *Narcissus* *Sci. Agric.*, 1942, 23: 1-3, bibl. 2.

The mortality in congelations formed by nematodes emerging from stored bulbs and unable to proceed further is 20% after one year, 85.7% after 2 years, 95.5% after three years, and 100% after 4 years.

243. TINCKER, A. H. 635.966
The care of cut flowers.
J. roy. hort. Soc., 1942, 67: 373-80, 392-5.*

A review of the literature having relation to the care of cut flowers with a view to prolonging their freshness. A large number of authors are cited and their findings briefly summarized. The information thus extracted covers a wide field and is of great interest.

244. COOLEY, J. S. 635.976.84: 632.48
Defoliation of American holly cuttings by *Rhizoctonia*.
Phytopathology, 1942, 32: 905-9, bibl. 3.

A leaf drop disease of American holly cuttings (*Ilex opaca*) caused by *Rhizoctonia* is described. Heavily contaminated beds were not sufficiently sterilized when treated with a number of disinfectants, but thorough sanitary measures such as renewing the cutting bed with fresh clean sand after washing the bench with disinfectant and the taking of precautions against recontamination proved effective.

245. BAIRD, E., AND LAURIE, A.* 635.939.872
Studies of the effect of environmental factors and cultural practices in bud initiation, bud abscission and bud development in the gardenia.
Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 585-8, bibl. 1.

245. WILDE, E. I., LINK, C. B., AND CULBERT, J. R. 635.931
Trials of annual flowers, 1941.
Bull. Pa agric. Exp. Stat. 426, 1942, pp. 52.
With particular but not exclusive reference to marigolds.

246. SEVERIN, H. H. P. 635.936.751: 632.8
Infection of perennial delphiniums by California-aster yellows virus.
Hilgardia, 1942, 14: 411-40, bibl. 38.
Including 8 page plates.
SEVERIN, H. H. P. 635.936.751: 632.8
Celery calico on perennial delphiniums and certain other host plants.
Hilgardia, 1942, 14: 441-64, bibl. 7.
Other hosts mentioned are tomato and cucumber. 6 page plates.
SEVERIN, H. H. P., AND DICKSON, R. C. 635.936.751: 632.8
Perennial-delphinium ringspot.
Hilgardia, 1942, 14: 467-90, bibl. 9.
A ring spot virus, vector not known. 4 page plates.

* The extensive bibliography is omitted and the original paper has been abbreviated for considerations of space. Complete copies of both are available at the Lindley Library, R.H.S., Vincent Square, S.W.1.

CITRUS AND SUB-TROPICALS.

247. CHAPMAN, H. D., PARKER, E. R., AND RAYNER, D. S. 634.3-1.84

Seasonal absorption of nitrogen by citrus.

Calif. Citogr., 1942, 27: 330, 348-9, bibl. 14.

A record of the weekly absorption of nitrate by 2 young citrus trees growing out of doors in full nutrient solution over 3 years showed that the period of least absorption was during January and February and that maximum absorption was during spring, summer and early autumn. The ratio between milligrams nitrogen and litres water absorbed fluctuated from 22.8 to 162.5, nitrate absorption being more closely related to periods of active root growth and water absorption to cycles of active top growth or to the physiological factors which regulate root and top growth. Total leaf area fluctuated greatly owing to the abscission of large numbers at various times. During March and April when the trees are in full leaf and blossom there is a heavy call on the reserve nitrogen in the tree which should have been accumulated during the preceding autumn. Studies to determine the relative importance of the nitrogen absorbed during the different seasons are needed.

248. SLOOP, K. D. 634.31-1.55

Valencia drop.

Calif. Citogr., 1942, 27: 341.

The circumstances attending a severe drop of Valencia orange were noted. Up to 50% of the drops were off-bloom fruit which had been on the tree for 22 months. Up to 25% were affected by the physiological trouble known as Valencia rind spot. In some groves most of the drops were normal and their fall may have been due to prolonged cloudy weather in June and July and to lack of thinning. Orange worm was responsible in some cases. Mealy bug was not responsible.

249. CHAPMAN, H. D., AND BROWN, S. M. 634.3-2.19—1.811.2

The effects of phosphorus deficiency on citrus.

Hilgardia, 1941, 14: 161-81, bibl. 18.

Young navel orange trees were grown in a calcareous, fine sandy loam in 55-gallon containers and supplied with nitrogen and potassium but no phosphorus. The first symptom of malnutrition was noticed 3 years after planting, when an abnormal shedding of leaves occurred after the spring bloom. Some leaves showed burned areas, and many had a dull green, bronzed, lustreless appearance [which is illustrated in colour]. Little new growth followed and the leaves were undersized. Spring blossoms in the two succeeding years were meagre and fruit almost entirely failed to set. There were few other abnormal symptoms. A secondary manganese deficiency developed in the phosphorus-deficient trees. It is noted that trees growing in the open on comparable soils showed no phosphorus deficiency symptoms, which indicates that the deficiency in the experimental cultures was partly the result of restricted root development.

250. CHAPMAN, H. D., AND BROWN, S. M. 634.3-2.19-1.811.7

The effects of sulfur deficiency on citrus.

Hilgardia, 1941, 14: 185-201, bibl. 10.

Sulphur-deficiency symptoms appeared in navel orange trees grown in granitic soil in 55-gallon containers and were very noticeable as abnormal yellowing of the new-cycle growth. Since these leaves had a higher nitrogen content than is normal it was possible to differentiate definitely between sulphur- and nitrogen-deficiency. Dieback occurred but otherwise no abnormal twig or bark symptoms. Growth was limited but there was profuse though weak bloom. Fruits were of a light yellowish-green colour and maturing fruits failed to develop a normal orange colour. Thickness of rind and lack of juice were noticeable. Analysis of

sulphur-deficient leaves showed generally a higher nitrogen, phosphorus, potassium and magnesium content and a lower calcium and sulphur content than normal comparable healthy leaves. It seems unlikely that local orchard soils would benefit from sulphur application.

251. BARTHOLOMEW, E. T., SINCLAIR, W. B., AND TURRELL, F. M. 634.31-2.19

Granulation of Valencia oranges.

Bull. Calif. agric. Exp. Stat. 647, 1941, pp. 63, bibl. 8.

The Valencia is the only orange in which granulation is of commercial importance in California. The causes of the condition cannot be definitely stated and it is difficult to point to definite circumstances which will with certainty produce granulation. There is, however, a strong tendency for certain trees in a given grove to be consistent from year to year in producing much or little granulation. The fruit on young trees is more subject to it than that on old trees. Its incidence does not usually become commercially important till after the middle of the picking season. A large number of tendencies and possible relationships between incidence and growth phenomena and cultural practices are discussed. Dry juice sac is suggested as an appropriate descriptive term for the physiological disorder known previously as "blossom end granulation".

252. RHOADS, A. S. 634.3-2.8

The successful transmission of psorosis of citrus trees in Florida by bark grafting.

Phytopathology, 1942, 32: 410-3, bibl. 7.

In 6 out of 12 inoculations by means of bark grafting from diseased to healthy citrus trees psorosis developed after a lapse of approximately 3 years in the neighbourhood of the graft. Where union was unsuccessful psorosis did not develop.

253. WAGER, V. A. 634.3-2.4

Pythiaceae fungi on citrus.

Hilgardia, 1942, 14: 535-48, bibl. 11.

This paper records results of investigations made in California in the 1939-40 season on the fungi present on citrus roots, in the course of which citrus fruits were inoculated with pythiaceae fungi. Records are shown of the geographic distribution of *Phytophthora* on citrus and a description is given of all *Phytophthora* and *Pythium* species recorded on citrus.

254. CHAPMAN, H. D., AND BROWN, S. M. 634.3-2.4: 631.8

Some fungal infection of citrus in relation to nutrients.

Soil Sci., 1942, 54: 303-12, bibl. 21.

Two of a number of cases of parasitic disease of citrus growing in sand and solution cultures brought on by nutritional conditions are described. Four-year-old Navel and Valencia orange trees on sour stock growing out of doors in solution of high potassium: low calcium content became infected with brown rot gummosis, *Phytophthora parasitica*. With more favourable potassium: calcium ratios no infection occurred, though *P. parasitica* could be isolated from the roots. In all cases conditions were exceptionally conducive to infection by this organism. Fruits on navel orange trees growing in unfavourable potassium: calcium ratio showed some water spot disease of the rind and considerable *Alternaria citri* infection. Fruit of trees in medium and low potassium cultures were unaffected. A black fungus, *Thielavia basicola*, attacked the roots of navels on sour stock at medium and high phosphate levels (1.5-5.0 m.e. per litre). Roots in slightly phosphorus-deficient media were slightly though much less affected. Increasing the acidity of the two high phosphate

cultures from pH 5.0 to pH 3.5 checked fungal growth and roots developing later showed no infection. The practical significance of these observations to citrus disorders in California is now being studied. The soils of many old citrus groves have marked accumulations of phosphate and potassium.

255. FRASER, L. 634.3-2.411

Phytophthora root rot of citrus.

J. Aust. Inst. agric. Sci., 1942, 8: 101-5, bibl. 10.

Phytophthora citrophthora, the cause of collar rot of citrus, is now shown to be responsible for certain root lesions and the premature decay of fibrous roots in citrus in New South Wales. The rotting of fibrous roots may have been in progress for some time before the larger roots show signs of decay and is thus difficult to detect. The tree, however, will deteriorate in health, show thinning of the canopy and poor leaf colour and cropping and fail to make adequate new growth. Of the commonly used rootstocks sweet orange is the most susceptible, followed by rough lemon; sour orange is rather resistant and trifoliolate is immune.

256. FRASER, L. 634.3-2.411

Citrus decline in the Murrumbidgee Irrigation Area.

Agric. Gaz. N.S.W., 1942, 53: 415-9.

The decline is attributed in great part to the fungus *Phytophthora citrophthora* which attacks the fibrous and even the main root system. Factors leading to the building up of high concentrations of the fungus in the soil are discussed and some remedies suggested. Among these is the use of resistant citrus stocks of which sour orange and *trifoliata* are outstanding. Sour orange is often unsatisfactory in other ways; there are evidently a number of strains, some more suitable than others, and considerable work on stock selection is indicated. Trifoliolate is also unreliable but fairly certainly successful with Late Valencias and grapefruit. The dwarfing tendency indeed results in reduction of yield but fruit hangs better than on rough lemon and there is little or no biennial bearing. The considerable variation in seedling stock should be of assistance in selection for stock improvement.

257. KLOTZ, L. J., AND FAWCETT, H. S. 634.3-2.411

Brown rot control.

Calif. Citrogr., 1942, 28: 18, bibl. 1.

Brown rot of citrus (*Phytophthora* spp.) when serious can be controlled by bordeaux mixture 6-6-100 applied to the ground beneath the tree and to trunk and foliage to a height of 4 feet. Under ordinary conditions 3-3-100 is suggested or 1-1-100 if cyanide fumigation is practised. A formula consisting of 5 lb. zinc sulphate, 1 lb. copper sulphate, 4 lb. hydrated lime, water 100 gal. decreases injury from fumigation and if applied to the entire tree corrects mottle leaf due to zinc deficiency. Results obtained with a number of other copper fungicides are tabulated and show that given a good adhesive any of them would provide adequate protection. Metallic material may gradually disappear under war conditions and the relative effectiveness of a number of non-metallic substitutes is to be the subject of a further report.

258. QUAYLE, H. J. 634.3-2.6/7

Control of citrus insects and mites.

Circ. Calif. agric. Ext. Serv. 123, 1941, pp. 31, bibl. 15.

This circular contains the essential facts which make possible the control of citrus pests in California. Most of it is devoted to the control of various scales, mites and thrips, other insects considered being aphids, orange tortrix, Fuller's rose beetle, Argentine ant, potato leaf hopper and mealy bug.

259. PERSING, C. O., AND OTHERS. 634.3-2.73

The resistance of citrus thrips to tartar emetic treatment in San Fernando valley.

Calif. Citrogr., 1942, 28: 5, 24-5, bibl. 4.

The citrus thrips (*Scirtothrips citri*) of San Fernando Valley, California, are shown to have developed a relative resistance to tartar emetic and other closely related compounds used as insecticides on citrus. This resistance is not shared by thrips from other districts or even from close at hand. Its nature is undecided but possibly a new biological race has arisen. As a substitute insecticide nicotine sulphate is suggested though not definitely recommended since the effectiveness of tartar emetic caused work on the nicotine sulphate to be dropped before its possibilities had been thoroughly explored. Nicotine sulphate 1 quart + 8 lb. sucrose (white sugar) per 100 gal. water applied with a broom gun at the rate of 2½ gal. per mature lemon tree or preferably with a spray duster at 1 gal. per tree affords a high initial kill and some protection for 4 weeks.

260. TURRELL, F. M., AND FISHER, P. L. 634.3: 581.192

The proximate chemical constituents of citrus woods,

with special reference to lignin.

Plant Physiol., 1942, 17: 558-81, bibl. 19.

LINDGREN, D. L. 632.752: 634.3

Fumigation in red scale control [of citrus].

Calif. Citrogr., 1942, 27: 308-9, 324.

261. TIEDJENS, V. A., AND SCHERMERHORN, L. G. 633.492

Sweet potato investigations in New Jersey.

Bull. N. Jer. agric. Exp. Stat. 697, 1942, pp. 20.

Recommendations are made for cultivation and manurial treatment of sweet potatoes under N. Jersey conditions.

262. MILLER, J. C., AND COVINGTON, H. M. 633.492: 577.16

Some of the factors affecting the carotene content of sweet potatoes.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 519-22, bibl. 11.

The carotene content of Porto Rico sweet potatoes increased rapidly during the first month of storage. There is a gradual increase during the second month of storage, after which time there is a trend for the carotene content to remain constant. Although the carotene content of sweet potatoes may be materially changed by environmental factors and cultural practices, the most feasible means of increasing the carotene content is by hybridization. [Authors' summary.]

263. BLIN, H. 634.62

Le palmier-dattier au Figuig. (The cultivation of the date palm at Figuig (Morocco).)

Rev. hort., 1941, 113: 515-6, 1942, 114: 22-4.

The district surrounding Figuig on the borders of Morocco and Algeria is a noted centre of date palm cultivation and contains at least 200,000 palms in some 40 varieties, of which 35 are briefly described in this paper. While the palms all look more or less alike the fruit of the various kinds presents sharp differences as does the quality. Propagation is largely by offsets. When recourse is had to seed no care is taken in the selection of the pollen parent. To produce fruit the palms are artificially pollinated, bunches of male flowers being tied into each female inflorescence. One male will fertilize 100 female palms. Later badly shaped or placed inflorescences are cut out, the petioles being consumed by the natives. About 10 bunches per palm are left. In planting the detached offsets for propagation the concave side is turned towards the east. The planting hole is filled with specially prepared soil mixed with human excrement which is considered to have exceptional manurial value. The offset set where it is to grow in March should have shown signs of life by June at latest. It begins to fruit in the 6th year and is in full bearing in 10 years. Maximum production of palm groves

is between the 25th and 50th years. Irrigation where possible is given every 7 days in summer or as the amount of water available permits. All varieties require much the same quality of water. To hasten maturity of the fruit the bunches are sometimes wrapped in cloth soaked in vinegar. The date harvest lasts from mid-September to the end of October, the fruit being picked while still green or pale yellow to prevent loss by drop. It is then ripened in the sun for 15-20 days. A bunch should yield 2-3 kg. Poor quality fruit is crushed and fed to stock or is distilled. Dates for storage are hung in bunches from rafters in an airy situation or buried in the earth in clay pots holding several cubic metres or in silos.

264. BLISS, D. E. 634.62-2.42
A new species of *Ceratosomella* [*C. radicola*] on the date palm.
Mycologia, 1941, 33: 468-82, bibl. 12.

265. PARRIS, G. K. 634.651-2.411
Phytophthora parasitica on papaya (*Carica papaya*) in Hawaii.
Phytopathology, 1942, 32: 314-20, bibl. 12.

A description of a wound disease of papaya causing hard rotting of fruits and cankers on the stem. Diseased fruits drop prematurely and mummify while cankered stems are girdled and the distal parts die from lack of nutrients or

water. The causal fungus is *Phytophthora parasitica*. Growers decapitate diseased trees, since so treated they produce fruit ~~more~~ quickly than replants. Bordeaux mixture russets the fruit, burns the young foliage and stunts the plants. Cuprocid 54-y does not produce these harmful effects.

266. WAGER, V. A. 634.653-2.411
Phytophthora cinnamomi and wet soil in relation to the dying-back of avocado trees.
Hilgardia, 1942, 14: 519-32, bibl. 16.

Decline of avocados in S. California appears to be associated with excessive moisture at the roots. Two fungi, *Phytophthora cinnamomi* and *Pythium vexans* are commonly found in the affected roots. It was found that the former only affected the roots seriously when waterlogging occurred for 24 hours or more. There are indications that *P. vexans* does not injure the roots.

267. WEBER, U. 633.88
Das "glückliche Arabien" und seine Drogen.
("Arabia Felix" and its drug plants.)
Disch. Heilpfl., 1942, 8: 93-100.

- PEDERSEN, M. W. 632.51: 632.96
A survey of biological destruction of cactus on Nebraska range land.
J. amer. Soc. Agron., 1942, 34: 769-70.

TROPICAL CROPS.

268. ANON. 63: 551.566.1(072)
The new Inter-American institute.
Agric. Amer. 1942, 2: 223-5.

An account is given of the decisions now reached for the establishment in Costa Rica of the newly formed Inter-American Institute of Agricultural Science. Sites were offered by most of the South American republics, that of Costa Rica being finally selected on grounds of easy access and general suitability for the experimental cultivation in a healthy climate of practically all tropical crops, for work on livestock and dairying under tropical conditions, reforestation, erosion control and the investigation of drainage practices. The Institute is conceived as a combination school of agriculture and agricultural research centre, the facilities of which will be used by all the American republics, though at present the organization, administration and most of the financing will be carried out by the U.S.A. The Director will be Dr. E. N. Bressman. If plans can proceed without serious check the proposed work of the Institute should soon become of considerable value to those engaged in the scientific study of tropical agriculture.

269. MILLER, C. D., AND LIND, H. Y. 612.3: 551.566.1

Food for health in Hawaii.

Bull. Hawaii agric. Exp. Stat. 88, 1942, pp. 84.

The sub-title of this bulletin is "Notes on choosing food and planning meals, with recipes and menus". It provides a most fascinating account of what to eat and why. Neither luxury—nor, it must be admitted, austerity—comes into the picture. Surely it should be in the hands of all responsible for drawing up dietaries in those fortunate parts of the tropics, where food, especially vegetable food, is plentiful.

270. GREGORY, G. B. 631.874: 631.459
Guatemala grass as a fodder crop in St. Lucia B.W.I.

Trop. Agriculture, Trin., 1942, 19: 192-3.

Guatemala grass (*Tripsacum laxum*) is recommended as a dual fodder and erosion control crop for contour strip planting on sloping land in St. Lucia. Manurial and cultivation experiments are described.

271. PICKLES, A. 632.6/7
The major pests of food crops and their control.
J. agric. Soc. Trin. Tob., 1942, 42: 187, 189, 191, 193, 195, 197, 199, 201, 203.

With reference to the food plants of the West Indies other than cacao and sugar cane.

272. PICKLES, A. 633.682
Cassava in the Amazon valley.
Proc. agric. Soc. Trin. Tob., 1942, 42: 141, 143, 145, 147-9.

The cassava grown in the Amazon valley is of the bitter type, sweet cassava being little used. The early maturing types are grown and reaped within a space of 6 months in districts subject to seasonal flooding. The long maturing varieties grown on higher lands take 20 months to mature. The middle portions of mature stalks are used for planting material and are collected when the crop is reaped. They may be stored without loss of viability for a year if kept from drying out completely. At planting they are cut in lengths of 8-10 inches and pushed obliquely into holes in the ground until flush with the surface. Spacing is from 3½ to 5 ft. apart. Sprouting begins 15-20 days later. Yield is from 8 to 20 tons per acre. The preparation of cassava meal, of which there are three kinds, is described in detail, since the author considers that many imported foods could be replaced by cassava products in the tropics and thus it would prove a useful weapon against blockade in wartime. In most parts of the Amazon country, for instance, cassava meal entirely replaces bread, and workmen engaged on strenuous manual labour are quite satisfied if their supply of cassava meal is secured. It is a concentrated foodstuff, sustaining and quickly satisfying. Apart from the meal, or farinha, tapioca is made from the starch left in the water used to wash the grated roots and in the juice expressed from them. The diluted cassava juice from which the starch has been removed by precipitation after culinary treatment is used in various condiments. A mild beer can be made by fermenting cassava.

273. TOCKLAI EXPERIMENTAL STATION. 633.72:1.535

Some general information on the selection and propagation of the tea plant.

Memor. Indian Tea Ass. Tocklai exp. Stat. 15, 1942, pp. 15.

Methods of selection of tea plants for cropping capacity, drought resistance and similar characteristics are described. Propagation can be from seed or vegetative. If the former the work entailed will be far greater. Recommendations, without discussion, for the successful propagation of the tea plant by cuttings are made. The cutting beds should be level with good natural drainage. The beds should contain no humus or cattle manure and should be hoed and then fallowed until a month before use. If nursery shading is used the beds must be watered several times after the shade is erected and before planting. North light shade and 6 ft. shade (the former is illustrated and its construction described) are equally effective. There are some disadvantages with each type. Cutting material is obtained by top pruning the selected bush in autumn; the shoots which then grow make suitable cuttings by June. The cuttings consist of a single leaf with a dormant axil bud and 1 to 1½ inches of stem below the leaf. Thus one shoot may provide several cuttings, all leaves on the shoot being used. Cuttings taken in August and September seem to root better, but the lower leaves on the shoot may have by then disappeared and that part of it must be discarded. Cuttings taken between 6 and 9 a.m. seemed to have a slightly better chance of survival. The soil in the beds should have been undisturbed for 14 days previous to planting. It may be watered if hard. Spacing between cuttings is 3 inches. At 6 months the rooted cuttings are transplanted to bamboo baskets 6 in. wide × 10 in. deep. The basket is eventually planted with the cuttings when it soon rots. In November rooted cuttings may receive nitrate of potash applied to the beds at 1 oz. per sq. yd. followed at once by copious watering. In crossing two tea plants their mutual pollen compatibility should be ascertained as even two individuals of the same variety may not cross-fertilize successfully. The technique of crossing is explained. It is quite simple since the pistil is ready to receive pollen before the flower is quite open and bagging is therefore unnecessary. There may be considerable fruit drop, the extent of which is believed partly to be influenced by previous cultural operations.

274. BOND, T. E. T. 633.72: 581.144: 581.44

Studies in the vegetative growth and anatomy of the tea plant (*Camellia thea* Link.) with special reference to the phloem. I. The flush shoot.

Ann. Bot., Lond., 1942, 6: 607-30, bibl. 26.

These studies were undertaken with the primary object of providing an anatomical background for investigations of the phloem necrosis disease of tea in Ceylon. In the present paper the author deals with the anatomy and periodic growth of the young unplucked shoots of *Camellia thea* growing in moist up-country zone of Ceylon at 4,500 ft. The type of bush is a light-leaved, high jāt of Assam origin. He discusses in turn the number of initials in the apical bud, the general anatomy of the flush shoots, stages in vascular development, aspects of leaf anatomy, ontogeny and structure of the phloem. Three pages of microphotographs are helpful.

275. TUNSTALL, A. C. 633.72: 582.6

Red rust [of tea].

Memor. Tocklai exp. Stat. 14, 1942, pp. 19, bibl. 10.

Red rust of tea is due to an alga, *Cephaleuros parasiticus*. Observations on its incidence and life history and control are made here. The author's experience leads him to believe that the chief factor affecting susceptibility to red rust is water supply. Young plants being susceptible to

cold weather droughts sustain checks which allow the parasite to take hold. In older tea restriction in depth of root system due to bad drainage or other factor is the most important cause. Lack of reserves due to injudicious plucking or pruning also conduces to red rust damage. Any manuring which encourages better growth of young plants may check damage indirectly by improving root growth. On the other hand any set of conditions likely to cause weakness in the plants is likely to favour damage by red rust. Spraying with bordeaux, burgundy or perenox early in the season will help to prevent damage.

276. THOMAS, A. S. 633.73

The wild arabica coffee on the Boma plateau, Anglo-Egyptian Sudan.

Emp. J. exp. Agric., 1942, 10: 207-12, bibl. 2.

The Boma plateau is unique in being the only place outside Abyssinia where wild *Coffea arabica* is known to grow. The author visited the locality in 1941. In the Barbuk area *C. arabica* was locally frequent, growing as a small tree with the crown above the shrubby undergrowth under the dense shade canopy provided by a closed forest. The root system of a large specimen had a mass of fine feeding roots, many right on the surface below the covering of fallen leaves. Further scraping exposed a system of well-developed lateral roots arising just below ground level and spreading horizontally. The leaves were large and dark green. There was considerable variation in leaf size from tree to tree but also between leaves on a single tree, thus the use of leaf characters for classifying wild coffee in the varieties would not be possible. There was much variation in size of fruit and to some extent in shape. Young seedlings were springing up freely. In the Rume area where the Italians had cleared the forest the coffee was growing singly or in groups among the maize. The root system resembled that of Barbuk but the leaves, doubtless from exposure, were shorter and narrower in proportion to their length. The coffee at Rume was considered to be of a different type to that at Barbuk, not because of size of leaf but because the Rume bushes were green-tipped while at Barbuk many were copper-tipped. Seed was collected and distributed to various research stations in the hope that it may give rise to types valuable in cultivation. Barbuk coffee had a very bold bean and the Rume coffee was growing at a relatively low elevation. The unleached soils in which the coffee was growing were low in phosphate and well supplied in potash and lime, the pH being 6.0 to 6.5. There is some doubt as to whether the coffee is truly indigenous. The value to breeding of the numerous wild coffee types on the Abyssinian highlands is pointed out.

277. MURRAY, P. W. 633.73

Coffee. Report on a visit to Haiti.

J. Jamaica agric. Soc., 1942, 46: 12-6.

SPRINGETT, —

More about coffee.

J. Jamaica agric. Soc., 1942, 46: 17-8.

In Haiti coffee, the staple crop, is grown entirely by the peasantry. The report discusses the following. 1. Haitian coffee as established throughout the island. 2. Steps taken for the improvement of coffee by the Haitian Government. 3. Steps taken for extending the area of coffee cultivation in Haiti. 4. Recommendations for the improvement of Jamaica coffee based on what Haiti has accomplished, as suited to Jamaican conditions and people. It is interesting to note that when in 1937 owing to cancellation of trade agreements in Europe Haiti was left with 300,000 bags of unsaleable coffee, unacceptable through lack of quality to the U.S.A., the government by energetic action based on specialist advice brought about such improvement that at the present day the U.S.A. takes the entire crop except that sold to Canada. The specialist on whose advice these results were achieved is Mr. Springett whose address to the

Board of the Agricultural Society on the Coffee Industry is summarized in the second paper. He discussed the reasons for the present inferiority of Jamaican coffee in the market. He mentioned, incidentally, that coffee grown from sea level to 2,000 ft. had one characteristic only, that of flavour; nothing will improve it and the flavour may be destroyed by bad processing. From 2,000-3,000 ft. coffee has flavour and body. At 3,000 ft. coffee has flavour, body and acidity. It is then high priced coffee used in U.S.A. for blending.

278. JOLLY, A. L. 633.74: 519
Uniformity trials on estate cacao fields in Grenada, B.W.I.

Trop. Agriculture, Trin., 1942, 19: 167-74, bibl. 1.
A series of manurial experiments on cacao has been instituted in Grenada in connection with a cacao rehabilitation scheme and is discussed here from the standpoint of design. It was found that a significant difference of 20% is the maximum that can be relied on in a single experiment on a field of cacao selected at random. For higher precision an area of more than 2 acres of uniform cacao is necessary. If great precision is required the scope of the experiment should be confined to two treatments. When a high degree of precision is not essential replications are required sufficiently numerous to give enough degrees of freedom for the error variance not to be seriously affected by the loss of one or two by the covariance analyses. The layout recommended for normal conditions is a repetition of latin squares; the plots may be 1/20 of an acre if sufficient replication is allowed. In experiments with three types of artificial manure and a control an area of 3-4 acres and a layout of 2 latin squares with half plots similar to those described in the article is desirable. [From author's summary.]

279. JOLLY, A. L. 633.74-1.55
Factors affecting field yields of cacao in Grenada.
Trop. Agriculture, Trin., 1942, 19: 234-43, bibl. 3.

The analyses of yields of 26 Grenada cacao fields by a somewhat complex statistical method on data averaged for 1940-41 and 1941-42 has given very satisfactory results. The method is described and the reasons for its adoption and various difficulties encountered are discussed. Briefly stated the conclusions reached are as follows. A large amount of field variation can be attributed to age of field, soil types and manurial status. Other factors affecting yield are not individually important. Although the effects of climate and exposure could not be studied statistically the data indicate indirectly inadequate shading especially on light soils and in exposed situations. Intensity of manuring has the most consistent and significant influence on yield and is cumulative over a long period. The heavier manuring of young trees might be profitable. Yield increased up to field age of 60 years and declined hereafter. Original trees under average treatment increase yield at the rate of $\frac{1}{2}$ lb. for every 10 years over an age range of 20-40 years and decline from the maximum at 60 years at $\frac{1}{2}$ lb. per tree every 10 years. They are most valuable productive material and every precaution should be taken to secure their maximum survival in the field. There is a higher casualty rate among trees in the first 20 than in the subsequent 60 years of life of a field. Under existing methods the effect of management is small. This does not necessarily mean that management is of the best but rather that established principles are followed by most. New methods of management, such as the use of imported planting material and the practice of a systematic policy of field rehabilitation would undoubtedly result in higher yields.

280. JOLLY, A. L. 633.74
(Results of work with respect to cocoa investigations.)
Proc. agric. Soc. Trin. Tob., 1942, 42: 107-9, 111-3, 115, 117, 119.

FARFAN, F. T.

Some reflections on a paper read by Dr. A. L. Jolly.

Proc. agric. Soc. Trin. Tob., 1942, 42: 121, 123, 125, 127-8.

In an address to the Agricultural Society of Trinidad and Tobago Dr. Jolly analysed the results of his work in connection with re-establishing cacao planting on an economic footing. He considered that the only feasible scheme to-day was the abandonment of unprofitable fields, which generally suffered from unsuitable soil types, and the replacement of non-yielders and unprofitable trees in fields that still paid their way. In the most profitable field of 17 examined the yield was 500 lb. per acre (at current prices 200 lb. per acre is considered profitable) yet no less than half the trees were unprofitable and could be replaced by selected stock. In this connection the probable value of plants from cuttings from selected clones was pointed out. For one thing young trees from cuttings have averaged $2\frac{1}{2}$ lb. of cacao per tree at 5 years old while at 7 years seedling trees still averaged only $\frac{1}{2}$ lb.

Mr. Farfan said that rehabilitation with supposedly superior material was not new and in fact had been much in vogue in earlier years, but ultimately the same degeneration had always supervened. Even so rehabilitation had only subsided in recent years because supplies of the present witchbroom resisting stock were not then available. He enumerated a number of operations necessary before the poor yielders could be determined. Every tree would have to be separately recorded over a number of years, the cost would be excessive and the practical planter had neither the time nor the labour. Since a relatively large number of trees, say 10%, admittedly die every year and should be replaced a plantation, except for the "die-hard" trees would be rehabilitated within 10 years in any case. If rehabilitation is the solution all that is required is for the Agricultural Department to see that the planter is supplied with the correct type of stock and that he correctly cultivates it when received. The speaker, however, did not place much faith in any gradual method of rehabilitation under estate conditions. He advocated a carefully planned rotational process in which fallowing and animal husbandry would be involved, the cycle to be 25 years, at which point he considered that senescence in cacao trees generally supervened. To ensure success there would have to be fair and controlled prices for the rotational crops over certain periods in certain delineated districts together with co-operative marketing, and the earnest collaboration of the Government would be essential.

281. POSNETTE, A. F. 633.74: 581.162.3
Natural pollination of cocoa, *Theobroma leicocarpa*, Bern. on the Gold Coast II.*
Trop. Agriculture, Trin., 1942, 19: 188-91, bibl. 6.

It was confirmed that an ant, *Crematogaster (Sphaerocrema)* sp. No. 1267, is an important pollinating agent of cacao in the Gold Coast and that the closely related *C. (Acrocoelia)* sp. No. 1286 is also an agent. Ants appear to be responsible for about half the pollination effected, flying insects being responsible for the rest. Aphids are of little significance. The low pollination records for March in 3 years of investigations is attributed to inactivity of the ants during this month and not to any effect on the trees of the low humidity which prevails during this month.

282. COBLEY, L. S. 633.74-1.535
The effect of shade on the growth rate of cacao cuttings.

Trop. Agriculture, Trin., 1942, 19: 227-33.
Treatments undertaken to discover the effect of shade on growth of young cacao and to determine the light intensity for optimum growth of cacao cuttings in Trinidad consisted of full shade (complete canopy), three-quarter shade, half

* For I, see *ibidem*, 19: 12-6; *H.A.*, 12: 630.

shade, one-third shade, and no shade. The plants used were a random selection of small rooted cuttings of all degrees of vigour planted in small and very heavily mulched plots in a sheltered situation. The shade was provided by canopies of split bamboo poles on cross pieces 8 ft. from the ground. The no shade cuttings were given temporary palm leaf protection until established. No further watering or manuring was given. The results for wet and dry seasons and for the total period strongly indicate that three-quarter shade is the optimum for growth, the increase under three-quarter canopy being many times greater than that under no shade, flushing, moreover, is rapid and the period between flushes rapidly diminishes. This degree of shade was obtained by removing every fourth bamboo slat from a completely covered area and respacing the remainder. The maximum light intensity thus provided on sunny days was 10-16 foot candles. The soil moisture content and soil and air temperatures showed little difference under the various degrees of shade and seemed to have little relation to the great differences in growth rates observed. The implications of these results are discussed in an editorial, *ibidem*, pp. 225-6.

283. POSNETTE, A. F. 633.74-1.532
Note on twinning cacao seedlings.
Trop. Agriculture, Trin., 1942, 19: 146.

As in the case of *Hevea* cacao seedlings can also be successfully and easily twinned, though there is some slight difference in method. The seeds are sown in sand boxes which are moved into direct sunlight immediately after germination to keep the hypocotyl from undue elongation. As soon as the cotyledons are fully open the plumule is cut off to stimulate the bud in the axils of each cotyledon. A two-stemmed seedling results. Before the first foliage leaves appear the seedling is lifted, the sand washed off the roots and hypocotyl and taproot bisected longitudinally with a razor blade. Thus the resulting twins have each an uncut stem, but only half the hypocotyl and taproot and one cotyledon. The seedlings are planted in baskets and kept well shaded. There is no check in growth, the only deaths, being about 3% of the twins, resulting from faulty manipulation of the cut. Even in such cases only one of the twins is likely to die.

284. BAKER, R. E. D., AND CROWDY, S. H. 633.74-2.4
Witches broom disease investigations. II. Notes on the susceptibility of I.C.S., selections at River Estate to witches' broom disease of cacao.*
Trop. Agriculture, Trin., 1942, 19: 207-9.

Observations started in 1940 on susceptibility to witches' broom disease (*Marasmius pernicius*) of 2-, 3- and 4-year-old I.C.S. cacao clones at River Estate, Trinidad, show that while none of the clones is immune or even highly resistant there are definite degrees of resistance, though whether these will be maintained as the trees grow up is uncertain. No account was taken of pod resistance. The results are summarized in 7 tables.

285. DARLING, H. S. 633.74-2.73: 612.014.44
The effect of light on the incidence of cacao thrrips.
Trop. Agriculture, Trin., 1942, 19: 151-62, bibl. 17.
Observations on cacao in the field at 50 stations in 5 localities in Trinidad and during controlled greenhouse experiments on clonal cacao showed that increase of light falling on cacao increased the incidence of thrrips [*Selenothrips rubrocinctus*], sometimes very greatly, by shortening their development period. The light, by modifying the cacao in some way not understood, favours the incidence of thrrips by accelerating reproduction. No evidence was found of a photo-tactic migration of adult thrrips.

* For I, see *ibidem*, 1941, 18: 107-16; *H.A.*, 11: 1391.

286. EBERHARDT, H. 634.6 + 633.912 + 633.74
Massnahmen für die Verbesserung des Pflanzmaterials von Ölpalme, Kautschuk und Kakao am Kamerunberg. (Measures taken to improve oil palm, rubber and cacao in the Cameroons.)
Forschungspflanzer, 1941, 44: 40-8, from abstract
Tropenpflanzdienst, 1942, Vol. 14, abstr. p. 24.

Deli oil palms from Sumatra proved highly valuable in the Cameroons where a mass selection had already been carried out when the present war broke out. As regards *Hevea*, out of 40,000 trees in 1930, 19 trees were chosen showing a daily yield of 36 to 120 g. dry rubber, and in 1931 8 trees with a daily average of from 69 to 120. In selection work with cacao no immunity was found to brown rot. Failure to crop depends on weather conditions during the rainy season, the fertility of the trees not being a decisive factor. The question of shade trees is also discussed.

287. VINE, H., THOMPSON, H. A., AND HARDY, F. 633.74-1.433
Studies on aeration of cacao soils in Trinidad. I. and II.
Trop. Agriculture, Trin., 1942, 19: 175-80, bibl. 6, and 19: 215-23, bibl. 6.

288. MAYNE, W. W. 633.83
Report on cardamom cultivation in South India.
Misc. Bull. imp. Coun. agric. Res. India 50, 1942, pp. 67, Re. 1/10 or 2s. 6d.

A survey is made of the cardamom (*Elettaria cardamomum*) industry of S. India. A full account is given including some interesting matter on cultivation. It is made clear that the cardamom industry is in urgent need of technical assistance. The cultivation is deteriorating rapidly with a great reduction of yield in which thrrips have begun to play a major part, and mosaic is also likely to be troublesome. The industry is chiefly in the hands of smallholders, many of whom are not resident on their properties. The recommendations include the establishment of an experiment station for cardamoms with 2 sub-stations and a programme of research based on selection and breeding with special reference to the multiplication of types resistant to thrrips. The scheme should be under the control of a small representative committee rather than under any one administration. A draft research scheme including the establishment required and expenditure necessary forms an appendix.

289. [LOOMIS, H. F.] 633.912-1.532
Split *Hevea* seedlings.
Science, 1942, 96: 2485, Suppl. p. 8.

A fairly full note on the recent work on twinning *Hevea* seedlings carried out at the U.S. Plant Introduction Garden, Coconut Grove, Florida [see *H. A.* 12: 1514]. The previous abstract did not mention that young seedlings growing in the open, the tops of which had been destroyed by cold or rabbits, could be split and replanted successfully after they had started new shoots from the side buds.

290. SORENSSEN, H. G. 633.912-1.541.42
Crown budding for healthy *Hevea*.
Agric. Amer., 1942, 2: 191-3.

An account of the building up in Brazil of high-yielding *Hevea* plantations immune to South American leaf blight, *Dothidea ullei*, to which high yielding clones obtained from the Far East often proved particularly susceptible. The successful method is to plant a part of all new areas with the highest yielding but susceptible Eastern clones and then to crown bud them after one year with tops from highly resistant though lower yielding strains. At first *H. guianensis* and *H. spruceana* and other immune species were used, but immune *H. brasiliensis* is preferable. No reduction of yield or quality of rubber has been noticed. Older established

trees are also topworked and by thus eliminating the tops of the spore-producing trees the number of disease spores should be greatly reduced and the possible development of virulent strains correspondingly lessened. Crown budding is also used to hasten the production of flowers for hybridization; trees of 4 to 10 years so treated will flower within 3 years against the 6 or 7 years required to flower year-old buddings and in much greater abundance. In a like manner the rapid production of budwood of a desired clone can be brought about. Clonal buds placed on older trees in good growing condition will produce several hundred usable buds within 12 months. The budding technique is described and illustrated.

291. WARDLAW, C. W. 634.771
Banana research at the Imperial College of Tropical
Agriculture, Trinidad, B.W.I.
J. roy. Soc. Agrs., 1942, 90: 644-55.

The author covers briefly the whole field of banana research at the Imperial College of Tropical Agriculture. The chief initial reason for the investigations was the marked susceptibility of the Gros Michel variety to Panama disease (*Fusarium oxysporum cubense*). Work involved a consideration of (a) the factors affecting the pathogenicity and spread of the disease, (b) breeding of highly resistant and otherwise suitable varieties; (c) cold storage transport and ripening of hybrids and varieties to see whether they could be substituted for Gros Michel. Observations on the spread of the disease showed that although cultivation practice can affect the incidence and severity of the disease the production of resistant varieties still remains the essential remedy. Difficulties in hybridization are described. Two hybrids with promising qualities emerged, named I.C.1 (occasional seeds and hence no good commercially) and I.C.2 (seedless). The storage properties of I.C.2 were promising. Work has also been done on gas storage possibilities and the outlook here is distinctly good. Unexpected developments have included the discovery in Trinidad in 1933 of the cercospora leaf disease (*Cercospora musae*). Gros Michel is badly affected, but I.C.2 offers resistance. Work in Suriname has now shown that the disease can be economically controlled. The fact that I.C.2 offers a fair degree of resistance indicated that the best hope of obtaining a commercial hybrid resistant to panama disease and to leaf disease lies in the same direction. The second unexpected development is the fact that I.C.2, after showing almost complete immunity to panama disease for years, has suddenly shown complete susceptibility in two areas in Trinidad. The only explanation offered so far is that of bud mutation.

292. LEACH, R. 634.771-2.4
Banana leaf spot, when to spray and why.
Publ. Leaf Spot Control Div. Dep. Agric. Jamaica,
(unnumbered), 1942, pp. 8.

Methods of control of the banana leaf spot disease, *Mycosphaerella musicola* (ascospore stage), *Cercospora musae* (conidiophore stage) were largely worked out in Suriname in 1937. Research in Jamaica has confirmed these results and in this bulletin the main problems are considered very clearly under the following headings: (1) principal features, (2) effect on plant, (3) basis of control by spraying, (4) crop hygiene, (5) methods of spraying, (6) spraying schedules, (7) activities of fungus (tabulated and in diagram form).

293. CROUCHER, H. H. 634.771-2.42 + 2.48
The menace of leaf spot.
J. Jamaica agric. Soc., 1942, 46: 20-1.

A brief review of banana leaf spot in Jamaica and the steps that should not fail to be taken to combat it, especially by the small grower.

294. RHOADS, A. S. 634.771-2.4
Notes on cliticcybe root rot of bananas [*Cliticcybe tabescens*] and other plants in Florida.
Phytopathology, 1942, 32: 487-96, bibl. 8.

295. LYMAN, C., AND DEAN, L. A. 634.774-2.19: 546.47
Zinc deficiency of pineapples in relation to soil
and plant composition.
Soil. Sci., 1942, 54: 315-24, bibl. 11.

A process for the polarographic determination of zinc in pineapple plants is described and a procedure for determining the soluble zinc in soils is suggested. A relationship apparently exists between the degree of zinc deficiency exhibited by pineapple plants and the soil zinc soluble in ammonium acetate at pH 4-6. Apparently the abnormalities of pineapple plants cured by spraying with zinc sulphate are a direct result of the inability of the soil to supply sufficient zinc to the plants.

296. SMITH, W. S. 635.1/7: 551.566.1
Vegetable growing in the plains of the United
Provinces.
Bull. Dep. Agric. U.P. 70, 1941, pp. 32, 4 annas.

Vegetable growing in the plains of the United Provinces, India, is very thoroughly treated. Provided the correct planting season is chosen it seems possible to grow all the European vegetables. The author is a firm advocate of constant tillage which he regards as the most important of all agricultural operations.

297. TOPPER, B. F. 635.64: 551.566.1
Tomato cultivation on the College Farm.
Trop. Agriculture, Trin., 1942, 19: 180-2, bibl. 8.

The results of cultivation experiments with tomatoes at the I.C.T.A., Trinidad, are recorded. In Trinidad close planting of staked plants $1\frac{1}{2} \times 3$ ft., gave higher total yields than the normal North American spacing of 2×3 ft. Staked and pruned plants yielded more heavily at 3 different spacings than unstaked and unpruned plants, partly because of damage to the latter from irrigators and irrigation water. A mulch of 8-8 tons per acre of dried cane trash applied after the second (of four) irrigations produced no significant improvement. In all experiments fruits were harvested in the mature green stage, had the pedicels clipped off and were graded. Experiments in earlier years failed to yield information as to manurial requirements. On this occasion (1942) the crop was manured with artificials in the proportion of 3 parts nitrogen to 4 parts phosphorus pentoxide to 3 parts potassium oxide at the rate of 1,260 lb. per acre, each plant thus receiving 2 oz. The manure was placed in holes 6 inches from the plants in 3 monthly applications, the first soon after transplanting. Root studies, using Weaver's trench method, showed root penetration to 5 feet at 5 months for staked and unstaked plants, though the unstaked and unpruned plants had the greater root development. Some notes are given on the common pests and diseases. Predisposing conditions for growth cracking were found to be (a) rapid growth after slow, (b) continuous rapid growth. The fruit of staked plants suffered more from growth cracking and blossom end rot possibly because of an unbalanced water relationship brought about by greater exposure to drying conditions. The fruit of unstaked plants suffered more from miscellaneous types of damage in the field, mainly scarring and sun scald. Constant reference is made to the results obtained in unpublished experiments carried out in 1933 and 1934.

298. IRO, K. 634.774-2.796
Seasonal trend in the development of the sex forms
of the fire ant, *Solenopsis geminata* (Fabr.) var.
rufa (Jerdon) in the pineapple fields of Oahu.
Proc. Hawaii ent. Soc., 1942, 11: 171-5.

STORAGE.

299. DAVIS, E., AND TOLMAN, W.

664.85.037 + 664.84.037

Preservation of food products by freezing.*Ext. Serv. Bull. Wash. St. Coll. Agric.* 230 (revised), 1942, pp. 19.

Deals with the freezing storage of dairy produce, eggs, game, meat, fish, vegetables and fruit and their treatment before and after. The information is tabulated.

300. PLANK, R.

664.85.037 + 664.84.037

Die Frischhaltung von Lebensmitteln durch das Gefrierverfahren. (Preservation of foodstuffs by the frozen pack method.) [Summary of lecture given at Wädenswil, 17 Sept. 1942.]

Schweiz. Z. Obst- u. Weinb., 1942, 51: 443-50.

The author stresses the fact that the new frozen pack method of preservation offers the great advantage of so keeping fruits and vegetables that they are eventually presented to the customer with the minimum loss of their essential fresh qualities, i.e. generally speaking with vitamin C content and flavour unimpaired. After dealing briefly with general points of freezing fruits and vegetables he notes the necessity for early action, even in the orchard, where the fruit should be put in portable freezers and thus removed. He then deals with the different steps necessary right up to the moment of consumption and in particular with the different technical methods used for the initial freezing at temperatures ranging from -20°C . to -35°C . The final storage room should have a temperature of about -20°C . with a relative humidity of over 90%. He deals also usefully with transport to the shop and eventual thawing and use by the consumer.

301. TODHUNTER, E. N., AND ROBBINS, R. C.

664.84.656.037: 577.16

Ascorbic acid (vitamin C) content of garden-type peas preserved by the frozen-pack method.*Bull. Wash. agric. Exp. Stat.* 408, 1941, pp. 28, bibl. 35.

Frozen peas after cooking retained 40 to 50 per cent of the vitamin C present in the original fresh raw peas, 30% being lost in scalding and preparing and 10 to 20 per cent in cooking. Delay in treatment after removal from pod resulted in considerable additional loss.

302. ANON.

664.85.11.037

Bath of cold water cools apples fast.*Bett. Fruit*, 1942, 37: 5: 15.

A new and quick method of cooling apples prior to storage is described. The fruit leaves the washer by roller and is carried into a 100 ft. \times 6 ft. cement tank, through which flows a revolving current of water at 800 gal. per minute cooled with a 10 h.p. compressor and an 80 ft. coil to 34°F . Apples of 58°F field temperature come out of the tank at 37°F in 50 minutes and all at exactly the same temperature. It is considered that further work on this idea may bring about the use of brine solutions which will make it possible to reach a temperature of 32° at the sorting table.

303. SMOCK, R. M., AND SOUTHWICK, F. W.

664.85.11.038: 632.19

Some factors affecting apple scald disease.*Science*, 1942, 95: 576-7.

Two years' results on Rhode Island Greening apple indicate that coating the fruit with a wax emulsion (Brytene 489 AM) gives considerable scald control, equal to that of oiled paper, on fruit picked at the normal time. On prematurely picked apples it is less effective. Waxed fruit kept in a greener and crisper condition than oil-papered fruit. Varieties susceptible to scald suffer earlier and more severe injury in the presence of volatiles from other, e.g. McIntosh, apples both in ordinary cold and controlled atmosphere storage than when stored alone. Failure to obtain complete control by air conditioning processes to eliminate harmful volatiles is

attributed partly to lack of knowledge as to when the absorbing material became saturated.

304. SMOCK, R. M.

664.85.11.035.1

Influence of controlled-atmosphere storage on respiration of McIntosh apples.*Bot. Gaz.*, 1942, 104: 178-84, bibl. 4.

McIntosh apples respired approximately one-third as fast in controlled-atmosphere storage at 40°F . as in ordinary cold storage at 32°F . The residual effect of controlled atmosphere storage on apples after their removal to high temperatures can be partially explained by a reduction in respiration rate following the storage treatment. The residual effect cannot be accounted for by persistence of a high carbon dioxide level in the tissues of the fruit. McIntosh held in cold storage at 32°F . evolved two and one-half to three times as much carbon dioxide during the same time period in storage as controlled-atmosphere fruit. The value and limitations of cumulative respiration curves for this type of study are indicated. [Author's summary.]

305. HUELIN, F. E., AND TINDALE, G. B.

664.85.13.035.1

Investigations on the gas storage of Victorian pears.*J. Dep. Agric. Vict.*, 1942, 40: 594-606, bibl. 2.

Six varieties of Victorian pears were gas stored at 32°F . and their storage life thereby definitely increased in most cases. Continuous gas storage in 5% CO_2 and 16% O_2 increased storage life of W.B.C., Bosc and Winter Cole by 100%, Packham and Winter Nelis by 30% and Josephine by less than 10%. Results with other atmospheres are also given. They were less generally successful. Continuous gas storage gave much better results than gas storage followed or preceded by air storage. Bosc pears in particular cannot stand even 5% CO_2 after 3 months in air. Bosc pears were uninjured when subjected to high concentrations of CO_2 for about a week during storage. Response of W.B.C. pears to gas storage varied with the picking date, the second picking being liable to gas injury even when made only 10 to 14 days earlier. Retardation of colouring in gas storage is largely a function of the concentration of oxygen.

306. CHANDLER, F. B.

664.85.73

Blueberry storage.*Science*, 1942, 95: 603-4, bibl. 2.

Experiments at the Maine Agricultural Experiment Station showed a great variation in the keeping quality of different clones of blueberry. Fully mature and overripe berries did not keep well in storage. The most suitable storage conditions appeared to be a temperature of 5°C . and an atmosphere with an oxygen content of 5% or slightly less. CO_2 contents of from 13 to 15% in the atmosphere were not detrimental.

307. ADAM, W. B., AND GILLESPIE, T. G.

664.85.22.035.1

The ripening of plums by means of ethylene.*A.R. Fruit Vegetable Pres. Res. Stat. Campden for* 1941, 1942, pp. 42-52, bibl. 3.

Pershire, Victoria and Warwickshire Drooper plums were picked when the fruit was still immature and hard and when it was in the firm ripe stage. They were packed in half sieves and divided into 3 lots, (a) untreated fruits, stored in a well ventilated room at $58-65^{\circ}\text{F}$., (b) fruit treated for 24 hours at $60-65^{\circ}\text{F}$. with ethylene (1:1000) and then stored as in (a), and (c) fruit treated for 48 hours with ethylene (1:1000) and then stored as above. The fruits of each variety and state of ripeness were treated separately. The exact method of treatment, sampling and analysis are described. The general conclusions of these experiments at Campden are that the method of ethylene treatment used in them produced no material increase in the sweetness or decrease in the acidity of plums but stimulated slightly the

ripening changes associated with flavour and colour. The percentage of mouldy fruits, occurring after storage for 4 or 5 days was greater in the ethylene treated fruit. There appears to be little advantage to be gained by using an ethylene treatment for plums required for canning.

308. KARMARKAR, D. V., AND JOSHI, B. M.

664.85.31.037

Investigations on the cold storage of Nagpur oranges.

Misc. Bull. imp. Coun. agric. Res. India 49, 1942, pp. 17, bibl. 30.

The authors report the results of the first known investigations on the cold storage of the (loose skinned) Nagpur (Santra) orange. They were carried out at the Cold Storage Research Scheme, Ganeshkhind Fruits Experiment Station, Kirkee, between 1935 and 1941. Oranges were stored in 3 conditions, viz. green (unripe), mature (green), and fully ripe (yellow), and were submitted to known temperatures between 32° F. and 68° F. The green unripe fruit proved unsuitable for storage, as it lost its juice at all temperatures. The mature (green and yellow) oranges could be kept in good condition for 3 months at 40° F. without appreciable wastage. At 52° the pulp began to lose its juice after 6 weeks. At 40° F. after 4 months fruit showed internal breakdown and the juice tasted bitter. This development showed earlier at 35° F. and 32° F. If fruit was allowed to colour for a month at 52° F. and was then transferred to 40° F. it could still be kept in good condition for 4 months in all. The percentage loss in weight of the mature (green) fruit appeared to be much more than that of the mature (yellow) fruit. It was, however, not much greater at 52° F. than at 40° F., though it occurred more in the pulp at 52° F. The percentage of total sugars in the juice did not show appreciable variation in fruit stored at 35°, 40° and 45°. The increase at 52° was due to concentration of juice as a result of pulp desiccation. The rate of respiratory activity at the time of storing was at 52° F., approx. double that at 40° F. It increased during storage at both temperatures. At 40° and 52° F. vitamin C content remained practically unchanged for 3 months. It appeared to increase with development of colour and flavour. At 52° F. decay of fruit was mainly due to stem-end rot. Wastage at 40° F. was due to internal breakdown resulting from physiological changes and this could be avoided by storage for the first month at 52° and then submitting to 40° F. On removal from cold storage at 40° the fruit remained good for 4 to 5 days at room

temperatures (77°-90° F.) but it did not stand up to rail transport at such temperatures. The loose skin allows free exchange of air inside the fruit with the outside atmosphere. Hence the fruit only needed 6 hours to drop from 84° F. atmospheric temperature to 40° F.

309. NELSON, R. C.

664.84/85.038

A method of studying the movement of respiratory gases through waxy coatings.

Plant Physiol., 1942, 17: 509-14, bibl. 1.

A micro-gas analyser is described, together with a technique for testing the permeabilities of waxy coatings to respiratory gases, using a cucurbit fruit as a test object. Tests made of three types of waxy coatings indicated that the permeabilities of the coatings to oxygen and carbon dioxide were critical in determining the success of the treatment, the ideal situation in this case being a high permeability to oxygen accompanied by low permeability to carbon dioxide. [Author's summary.]

310. MACK, W. B., AND JANER, J. R. 664.84.63.038

Effects of waxing on certain physiological processes of cucumbers under different storage conditions.

Food Res., 1942, 7: 38-47, bibl. 22.

The most striking differences brought about by wax treatment were reduction in weight loss and in spoilage in the ordinary room; increase in pitting in cold storage, a characteristic low-temperature injury on cucumbers; and a significant increase in the respiratory quotient in cold storage, indicating a greater degree of suboxidation. [From authors' summary.]

311. EDMOND, J. B., AND DUNKELBERG, G. H.

633.492: 631.588.1

Use of electricity in curing and storing sweet potatoes.

Proc. Amer. Soc. hort. Sci. for 1942, 1942, 40: 528-30.

Electricity was found suitable for maintaining temperatures in the storing house of sweet potatoes at 78° to 85° F. during the curing period, for gradually lowering the temperature during the post-curing period of 10-14 days from 80° to 55° F. and for maintaining a temperature of 50° to 55° F. during the storage period. During all these periods the relative humidity was maintained at between 78 and 96 per cent. by wetting down the floor as required.

PROCESSING AND PLANT PRODUCTS.

312. (UNITED STATES DEPARTMENT OF AGRICULTURE.)

664.8.047

The commercial dehydration of food in wartime.

Fruit Prod. J., 1942, 21: 372-4.

A semi-popular account of the general principles of dehydration of food, chiefly fruits and vegetables, and a note on the work in progress in U.S.A., Canada and the U.K.

313. U.S. DEPARTMENT OF AGRICULTURE.

634.11-1.56

Apple manufactures. The use of apples in cider mills, evaporators and canneries in New York State 1937-41.

Fruit Prod. J., 1942, 22: 49-51.

Summarizes the quantity of apples received at the various processing plants from 1937-41 and includes a statement of products manufactured and other pertinent data.

314. DICKSON, H. 663.813: 634.11

The relation of yeast multiplication on the composition of apple juice.

Ann. Bot., Lond., 1942, 6: 637-44, bibl. 2.

These experiments which were of an exploratory nature were

carried out at the Long Ashton Research Station. Results which are also set out graphically are summarized as follows:—"Brief descriptions are given of laboratory experiments on the fermentation of apple juice with special reference to nitrogen consumption in the juice. It is found that all available nitrogen in a juice is used up and yeast multiplication practically ceases for a fall in gravity of about 0.02. The smallest total nitrogen content obtained in any juice following fermentation was 0.002 per cent. The addition of different salts to a partially fermented juice shows that loss of nitrogen is the most important factor in the reduction of cell multiplication as fermentation proceeds. Following the initial reduction in the total nitrogen content of a juice a small final increase has been recorded in several experiments; it occurs when fermentation is nearing completion, i.e. when all the sugar available has been used up. The amount of nitrogen extracted from a juice for a given fall in gravity varies with the seeding rate. It was found that as the seeding rate increased it increased up to a maximum and then began to decrease. An explanation is advanced to account for this differential consumption of nitrogen and sugar."

315. [BRADSHAW, M. A., AND MOTIERN, H. H.] 663.813: 634.11
Production of a bland syrup from apples.
Fruit Prod. J., 1942, 21: 356-, from *Publ. U.S. Dep. Agric. ACE-180*.
 Details of plant and method used in the production of a syrup of apples similar to commercial invert syrup and having no flavour of apple whatever. It is suggested that the product would be a useful substitute sweetener for sugar.
316. KRAMER, M., AND SATTERFIELD, G. H. 577.16: 663.25 + 663.39
Ascorbic acid content of four varieties of raw wines.
Food Res., 1942, 7: 127-9, bibl. 12.
 A study was made [in North Carolina] of the ascorbic acid content of apple, peach, and black and white scuppernon wines that had been stored for a year or less. No ascorbic acid was found in the wines. [Authors' summary.]
317. SCHULLE, H. 663.39
 Fehler bei der Obst- und Beerenweinbereitung und ihre Verhütung. (Faults and their prevention in the manufacture of fruit wines.)
Geisenheimer Mitt., 1941, 56: 1:8-11, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 30.
 The article noted is, apparently, a list of common faults with recommendations of how to avoid them when making fruit wines.
318. CRUESS, W. V. 634.21-1.56
Debitting of apricot kernels.
Fruit. Prod. J., 1942, 21: 365.
 A brief account of several successful methods. They are not new, but are restated because the shortage of almonds has directed attention to the substitution of apricot kernels, after removal of the bitter principle amygdalin, a hydrocyanic glucoside.
319. JOHANSSON, E. 577.16: 664.85.047 + 664.84.047
 Askorbinsyrehalt hos frukt och köksväxter i färskt och torkat tillstånd. (Ascorbic acid content of fruit and vegetables, both fresh and dried.) [English summary 2 pp.]
Meddel. Statens Trädgårdsförsök 8, 1940, pp. 26, bibl. 10, reprinted from *Årsskr. Alnarps lantbruks-, mejeri-, trädgårdsinst.*, 1940.
 The author gives a further report on the continuation of work at Alnarp previously reported in 1939 (see *H.A.*, 1939, 9: 1443). Vitamin determinations were made on the less common varieties of fruit and again on such varieties as previously showed particularly high vitamin content. Results, which are tabulated, confirm the previous findings as regards pears and apples. White Winter Calville again showing the highest vitamin C content of the apples tested. Certain recent seedlings raised at Alnarp gave promising results. Vegetable analyses also confirmed previous work, cauliflower, parsley and spinach all showing high contents. Rapid parboiling followed by boiling for 20 minutes restricted the loss of ascorbic acid in cauliflower to about 30%. In spinach the loss was about 50% on boiling. Tomatoes grown in Sweden on sale as late as December showed a high content (about 10 mg./100 g.). Dehydration in a stream of nitrogen at a low temperature for 2-4 days resulted in products of good appearance, the loss of vitamin varying, thus in all vegetables it was considerable, whereas with fresh apples it was considerably less. As regards retention of ascorbic acid this method does not seem to be superior to dehydrating at a higher temperature over a heat radiator. Loss of ascorbic acid in apples dehydrated by the latter method was under 30% in most cases and sometimes considerably less. Dehydration in a ventilated drier at a high temperature of 70-100° C. without rarefaction of the air resulted in heavy loss of ascorbic acid in apples and vegetables. Only in the case of parsley did this method seem preferable. After a short period of evaporation parsley leaves were dried at about 20° C. with a loss of only 12% of ascorbic acid content. The loss varied, being less in younger than in older leaves.
320. WAAGEN, H. K., AND PETT, L. B. 577.16: 613.2
The adequacy of vitamin C in Alberta diets.
Canad. J. Res., 1942, 20, Sec. B, pp. 246-54, bibl. 18.
 Some sources of vitamin C in Alberta.
Canad. J. Res., 1942, 20, Sec. B, pp. 274-83, bibl. 13.
 The average daily intake of vitamin C per person from November to May in a residence for men at Alberta University was 41 mg. from November to May and 82 mg. from June to October. If citrus fruits had been excluded from the diet the intake would have been markedly less. In the second paper the authors report on the vitamin C content of a number of fruits and vegetables (tabulated results) grown in Alberta and the loss occasioned by cooking. Losses of vitamin C due to oxidation during cooking were compared with those due to extraction by the cooking water. Both cause much loss, though which is the greater factor seems to depend on the vegetable. Considerable waste is incurred through discarding the cooking water in the case of vegetables. This is not done with fruit. Vitamin C content of potatoes reaches its peak in September and declines steadily during storage.
321. DEFELICE, D. 664.85.25: 577.16
Effect of processing on carotenoid (provitamin A) content of peaches.
Food Res., 1942, 7: 16-25, bibl. 19.
 Observations on provitamin A content of peaches indicates that as regards provitamin A content both frozen sliced peaches and frozen peach pulp are of greater nutritive value than peach juices, in which losses of from 50 to 90 per cent. of the vitamin A potency occur during processing and preservation.
322. POLLARD, A. 634.723: 577.16
Vitamin P in blackcurrants.
Nature, 1942, 150: 490-1, bibl. 3.
 A product of blackcurrant is shown to provide a source of vitamin P in a relatively concentrated form suitable for further study. The method of isolating the fraction showing vitamin P activity is described.
323. PUFFER, M. E., AND OTHERS. 635.1/7: 577.16
Vitamin C, carotene, calcium and phosphorus in expressed vegetable juice.
Food Res., 1942, 7: 140-3, bibl. 8.
 The vegetables used in these trials at the University of Chicago were celery, cabbage, carrots, spinach and green beans and extraction was done with an inexpensive hand-turned juicer. It was found that vegetable juices contain from 8 to 69 per cent. of the reduced ascorbic acid, from 22 to 36 per cent. of the carotene, from 15 to 90 per cent. of the calcium, and from 24 to 62 per cent. of the phosphorus of the whole vegetable. Weight for weight most of the juices are almost as good sources of nutritional elements as are the whole vegetables. [Authors' summary.]
324. ADAM, W. B. 577.16: 664.85.036.5 + 664.84.036.5
Factors affecting the vitamin C content of canned fruit and vegetables. Progress report.
A.R. Fruit Vegetable Pres. Res. Stat. Campden for 1941, 1942, pp. 14-20.
 Tests are in progress with gooseberries, logans, blackberries, peas, broad and stringless beans, carrots, parsnips, swedes, potatoes and sprouts, and so far the following facts have

emerged:—The effect on vitamin C content of head space, even in cans closed at 80-85° C, is very marked. Normal head spaces may account for a loss of 20-30% of the vitamin C originally present in the cans. Plain cans offer more protection to the vitamin C than lacquered cans. Normal variations in methods, time and temperature of processing do not significantly affect the vitamin C content, sprouts proving an exception in this respect. Storage of cans at normal temperatures for periods up to 6 months does not appreciably affect the vitamin C content of canned gooseberries, peas, broad or stringless beans. Some loss on storage appears to occur in canned logans and blackberries.

325. ADAM, W. B., AND HORNER, G.

664.84.036.5: 613.2

The effect of blanching on the nutritive value of canned vegetables. I. Chemical changes.

A.R. Fruit Vegetable Pres. Res. Stat. Campden for 1941, 1942, pp. 21-31, bibl. 4.

The practical conclusions reached from tests with peas, broad, stringless and runner beans, carrots, potatoes, parsnips, sprouts, swedes, dried peas and dried beans are that blanching is desirable in some cases (and may be safer in all) on account of improved flavour, but that this effect is achieved by blanching for not more than 1 or 2 minutes. Blanching in steam results in better retention of nutritive constituents than in water and gives a final product of about equal quality. The economic substitution, however, of steam for water blanching for 2 or 3 minutes seems doubtful. Two to five minutes should be regarded as a normal maximum time for bleaching, the first essential in wartime being the preservation of maximum nutritive value.

326. ADAM, W. B., AND STANWORTH, J.

664.84.036.5.

Physical changes occurring during the blanching of vegetables.

A.R. Fruit Vegetable Pres. Res. Stat. Campden for 1941, 1942, pp. 32-41.

Conclusions drawn from trials at Chipping Campden are as follows:—(1) Blanching generally causes a reduction in weight of vegetables. (2) It causes a sharp increase in specific weight, which means a considerable shrinkage in volume due to expulsion of gases and collapse of tissues. (3) It causes a sudden shrinkage in the volume of most vegetables, potatoes, soaked peas and soaked beans being exceptions. (4) Unblanched vegetables can be packed without serious risk of excessive pressures developing during processing, provided the cans are exhausted and closed at a high temperature. (5) Cans of unblanched vegetables show appreciably larger head spaces than cans of blanched vegetables. (6) The vacuum is greater in cans of blanched vegetables but the increase of vacuum produced by blanching is of little practical significance. (7) Most vegetables increase in weight during processing but this increase is much less in unblanched than in blanched material. Hence, if cans of unblanched and blanched vegetables are packed to equal capacity, the effect of the lower filled weight of the unblanched material and its added shrinkage during cooking will be to reduce the drained weight of the unblanched vegetables to about 85 to 90% of that of the blanched vegetables. This is much the most important physical advantage produced by blanching and involves a considerable saving in tin plate and bulk. Five minutes should not be exceeded for the blanching process except in the case of large tough roots which may need longer treatment to enable them to be subsequently sliced or diced.

327. CRUICK, W. V., VAUGHN, R., AND GILLILLAND, R.

634.63-1.56

Storage experiments with pickled olives.

Fruit Prod. J., 1942, 22: 40-1, 61.

Experiments with the bulk storage of olives have led to the following recommendations. If bulk olives are offered for

sale in large volume the authors recommend as a preservative brine of 25° salometer to which 100 grain vinegar is added to give an initial concentration of 2 per cent. acetic acid, or that 1 per cent. lactic plus 0.1 per cent. sodium benzoate be used. Chopped olives were kept with 1 per cent. added acetic acid and 4 per cent. added salt; probably less salt and less acid would suffice if 0.1 per cent. sodium benzoate were added.

328. MUNSELL, H. E. 577.16: 635.1/7

Riboflavin content of some common foods.

Food Res., 1942, 7: 85-95, bibl. 43.

Among horticultural foods tested for their riboflavin content were beans, broccoli, cabbage, endive, lettuce, peas, pepper, spinach, beetroot, carrots, potatoes, sweet potatoes and dried navy beans.

329. AYKROYD, W. R. 577.16: 664.84.047

Stability of ascorbic acid in dehydrated vegetables.

Nature, 1943, 151: 22-3.

Experiments are briefly mentioned which show that ascorbic acid in dehydrated vegetables and fruits is not likely to be very stable unless the products are packed in containers from which oxygen has been excluded. Thus cabbage and cauliflower lost 50% of the ascorbic acid originally present in the dehydrated material in 12 weeks when kept at 37° C. (tropical conditions) in sealed but not exhausted tins. In other samples of these vegetables similarly stored at 18°-23° C. the loss was 70-75% in 6 weeks.

330. WILSON, R. H., THOMAS, J. O., AND DEEDS, F.

664.84.13.047: 577.16

Vitamin A value of fresh and dehydrated carrots.

Fruit Prod. J., 1942, 22: 15-7, 27, bibl. 7.

Investigations are described which represent the first attempt to study the parallelism between the chemical and biological methods for evaluating vitamin A both before and after a processing technique. As judged by either method the loss in provitamin A during dehydration of carrots was not serious.

331. WOKES, F., AND ORGAN, J. G. 635.64: 577.16

Vitamin C from green tomatoes.

Nature, 1942, 150: 523-4, bibl. 3.

Vitamin C in green tomatoes does not increase perceptibly through ripening. When pulsed as for chutney 92% of the vitamin C may be destroyed in 7 minutes whereas in red ripe tomatoes only 27% is lost. Unripe tomatoes, therefore, when being made into chutney should not be sliced too finely and should be put immediately into strong vinegar and the sugar added without undue delay. No tomatoes should be discarded merely because they are small or unripe.

332. CROCE, F. M. 664.84.64.036.5

Elaboración de tomates al natural... en Mendoza. (The tomato canning and bottling industry in Mendoza Province, Argentine.)

Rev. B.A.P., 1942, 25: 300: 43-7.

The tomato canning industry is developing very rapidly in the Province of Mendoza. An account is given of the regulations by which it is controlled and the method of processing the fruit.

333. BELVAL, H. 635.24: 581.192

Le sucre de topinambour. (Sugar from artichokes.)

Rev. hort., 1942, 114: 70-1.

An account of how to extract sugar from Jerusalem artichoke. The extracted syrup is formed chiefly of levulose and will not crystallize; it keeps well and at equal weights has twice the sweetness of beet sugar.

34. JONES, J. M., AND OTHERS. 664.85.3: 636.086
Dried citrus pulp in beet cattle fattening rations.
Bull. Tex. agric. Exp. Stat. 613, 1942, pp. 20,
 bibl. 20.

In trials at the Texas Experiment Station a mixture of 75 parts ear corn chop with husk and 25 parts dried citrus pulp consisting of grapefruit peel, rag and seed as the carbohydrate concentrate proved a satisfactory fattening ration for bullocks. Results from the use of 40% or higher quantities of pulp were not so satisfactory.

335. CROCE, F. M. 663.813: 634.21 + 634.25
Jugo de damasco y de durazno. (Processing of apricot and peach juices.)
Rev. B.A.P., 1942, 25: 295: 15-7, 19.

- COX, M. J., AND MACMASTERS, M. M. 664.85.037 + 664.84.037
Microscopic studies of tissue of frozen fruits and vegetables.
Food Res., 1942, 7: 135-9, bibl. 3.

NOTES ON BOOKS AND REPORTS.

36. CHANDLER, W. H. 634.1/6
Deciduous orchards.
 H. Kimpton, London (printed in America), 1942,
 pp. 438, bibls., figs. 109, 21s.

American books on fruitgrowing and horticulture tend to stress the basic scientific facts underlying those subjects rather than the practices themselves. The result is sometimes a book which is of immense use for examination purposes but has little appeal to the practical fruitgrower. Such an accusation will not stand against the present volume, as more than a third of it is devoted to a consideration of the practical aspects of the growth and cultivation of apples, pears, plums, apricots, almonds, peaches, cherries, mulberries, figs, persimmons, the Northern papaw, pomegranate, jujube, walnut, hickories, hazels, sweet chestnuts, pistachio and tung oil with additional information on the harvesting and storing of apples. Small fruits are not included.

In his preliminary chapters Chandler gradually works up from a consideration of the organic materials essential to growth, the histology of the tree, resting buds and their demand for chilling, the factors affecting flower bud formation, pollination and the setting of fruit to the growing fruit and finally the mature fruit. The chapter on the mature fruit is a particularly interesting one, and it gives considerable information on colour, flavour, market quality, changes during ripening and breaking down, respiration and handling after picking. A chapter is devoted to killing temperatures, including both low and high temperatures. The author considers that heating of deciduous orchards usually does not pay except with such fruits as early apricots which are nearly all grown in one district, so that the price of the fruit tends to be high in summer following severe spring frosts in that one section.

In a chapter on vegetative propagation he considers at some length propagation from cuttings. He is scarcely optimistic in summing up a discussion of the use of growth substances as follows:—"... there is as yet no good evidence to give hope that by treatment with auxin alone or with auxin followed by any other substance, propagation by stem cuttings can be made economical practice for any deciduous orchard varieties not now propagated in that way." Other chapters concern transplanting, soil problems, nutrient problems, water supply in tree and fruit and response of trees to pruning. A welcome innovation is the inclusion of a chapter of 36 pages on the elements essential to growth and health including the more important minor ones.

The author deals in considerable detail with the rootstock problem particularly as affecting apples. He would not appear to favour dwarf trees, judging from the remark:—"There must be some stronger reason than desire for early bearing that causes so many intelligent apple growers in Europe to plant dwarf apple trees."

He refreshingly departs from the increasing habit of piling up the references. Those given are mainly to articles in which the particular subject can be studied further or, in the section on pome and stone fruits, to a few articles dealing with the control of pests and diseases, which are otherwise omitted.

The book, which is pleasant to read, is obviously based on a lifetime of teaching and a continuous study of modern fruit research and, while perfectly competent to help in defeating the examiner, it should have a very strong appeal to the intelligent, practical fruitgrower.

337. PIRONE, P. P. 632.932.635.977
Maintenance of shade and ornamental trees.
 Oxford University Press, New York, 1941,
 pp. 422, \$5, Humphrey Milford, London,
 25s. 6d.

Dr. Pirone, who is associate professor of plant pathology at Rutgers University and one of the outstanding pathologists of ornamental plants, has produced from his considerable experience a handsome and comprehensive work on the planting and care of shade trees. Although written primarily for the U.S.A. the principles laid down so ably are such as should be practised wherever ornamental trees are grown. Except for the tree lists there is very little of purely local significance, for the pests and diseases, both of which receive considerable attention in this book, are mostly cosmopolitan or have their counterparts in other countries. The book is divided into two parts. Part I, *General maintenance practices*, includes a short account of the anatomy and functions of the tree and its parts and its relations with the soil. Other chapters are concerned with transplanting trees of all sizes, the use of fertilizers, pruning and wound treatment, cavity treatments and various kinds of bracing and supporting, roadside planting. Part II, *Specific abnormalities of trees*, covers injuries, pests and diseases and their treatment or prevention, at first taken generally and later, as regards the pests and diseases, under the name of the tree which they afflict. The method adopted renders it possible to discover at a glance the ills to which each of the principal ornamental trees may be liable. Diagnosis of any particular trouble is thus brought within the capacity of anyone likely to be interested. For its clarity of expression, comprehensiveness of treatment and workmanlike simplicity of arrangement this book should satisfy both amateur and professional. Naturally all is not new. Many of the methods advocated will be familiar but their repetition here can be taken as proof of their value and the author generally has something cogent to add from his own experience. There is a good bibliography subdivided to cover each chapter. Although the name Le Sueur is here consistently spelt in a manner differing from that employed by its owner no great harm is done. The illustrations, which number over 170, are admirable.

338. U.S. DEPARTMENT OF AGRICULTURE. 551.5: 63
Climate and man. Yearbook of Agriculture 1941.
 Supt. Documents, Washington, D.C., 1941 (?),
 pp. 1248, \$1.75.

This book contains an immense amount of information on the effect of climate on agricultural practice. Particular attention is given to the climates of the individual States and of U.S. Territories outside the U.S.A. proper. [For particular articles see also abstracts 34, 130, (131).]

339. NATIONAL RESEARCH COUNCIL OF CANADA.

5(06)(71)

(COOK, S. J., AND HOWARD, P. A., compilers.)
Handbook of scientific and technical societies and institutions of Canada.

Reprinted from *Bull. Nat. Res. Coun. U.S.* 106
Handbook of Scientific and Technical Societies and Institutions of the United States and Canada,
 Fourth Edition, Washington, D.C., 1942, being
 N.R.C. 951, 50 cents.

Societies interested in agriculture included are:—the Canadian Society of Technical Agriculturists, National Research Council of Canada, Ontario Agricultural and Experimental Union and Ontario Association of Agricultural Societies.

340. NILSSON, E.

635.1/7: 631.531

Köksväxtfröodling. (Seed production of vegetables.)

Nordisk Rotogravyr, Stockholm, 1940, pp. 160, Kr. 2.75.

The information given in this book is based mainly on the practical experience of the author and of others, since but few results of experiments on seed production of vegetables in Sweden are available.

It is pointed out in the introduction that seed production of vegetables was actively prosecuted in Sweden during the first world war but that subsequently it declined. More recently, however, interest in the subject gradually increased, unassociated with any crisis, and it has been found that a large number of species can profitably be grown for seed in the country. The State has begun to show an interest and restrictions have been placed on seed imports.

The author considers, however, that for seed production to be fully efficient experimental work on not too modest a scale is absolutely essential.

A matter regarding which reliable information is of great importance for economic results is, for example, the question of manuring. It cannot be taken for granted that the manuring most suitable for the ordinary products of cultivation is also best for the same crops grown for seed. Here well planned experiments should be able to furnish both useful and cheap advice. There is also a lack of knowledge as to the cheapest and most satisfactory way of obtaining the best possible quality in the seed produced, a problem which again can only be solved by experiment. Included in the book are sections dealing with stock seed and the commercial production of seed; the risk of cross-fertilization; situation of the seed plot; manuring; sowing and cultivation of the soil; management during the growing period; winter storing and planting out; harvesting, drying and cleaning; State control of vegetable seed; cultivation for seed production of the various crops including legumes, tomatoes, cucurbits, spinach, salad plants, cabbage plants, asparagus, rhubarb, umbelliferous and cruciferous roots, other roots, black salsify, bulbous plants and sweet herbs. The author expresses the hope that the plant breeder will facilitate the seed production of those species which at present are difficult.

The photographs and drawings included in the text add considerably to the usefulness of the book.

341. THE GAMBIA.

635.1/7: 631.531

Annual Report of the Department of Agriculture, The Gambia, for the year ending 31st May, 1942, pp. 8.

Local vegetable seed production being a problem of the war it is noted that tomatoes, lettuce, and New Zealand spinach are being successfully grown for seed and that some seed has been obtained from Chinese cabbage. Other popular vegetables are being grown experimentally for seed production.

342. GOLD COAST.

635.1/7

Report of the Department of Agriculture, Gold Coast, for the year 1941-42, 1942, pp. 7, 1s.

Brief notes are given on the various crops. Attempts have been made to produce seed locally of various European vegetables. Success has been obtained with pole beans, Lima beans, lettuce, egg plant, cucumbers, pumpkin, tomato, artichokes, kale, shallots. So far cabbage, cauliflower, carrots and turnips have failed to seed; experiments are continuing. For consumption, however, practically every European vegetable can be grown successfully in the Gold Coast if the suitable variety is chosen.

343. INDIAN TEA ASSOCIATION.

633.72

Annual Report Indian Tea Association, Scientific Department [Tocklai] for 1941, 1942, pp. 10.

Manuring. The outstanding value of nitrogen and the small and generally non-economic value of phosphoric acid and potash in maintaining a high production level in the case of the tea bush have been demonstrated from reliable data. The growing of leguminous crops will to some extent replace nitrogenous manure, though the value differs with variety. Cowpeas proved inefficient over a period of 2 years, but *Boga medeola* over seven years gave a total increase of tea crop of 8.3 maunds per acre. Sulphate of ammonia applied at the rate of 150 lb. per acre for 2 successive years gave a total increase of 4.8 maunds per acre over 7 years. The tree *Albizia stipulata* interplanted simultaneously with tea of equal age (1 year from seed) at first restricted but after the third year markedly benefited the tea bushes, increasing yield by 2.14 maunds per acre. Response to added manures is less where the tea is growing under shade than when unshaded. *Vegetative propagation.* The admixture of cattle manure in the cutting beds or the subsequent watering of the cuttings before rooting with cattle manure water was detrimental. Cuttings rooted well with the bottom cut immersed in plain water. Differences in the early root system of cuttings and seedlings are noted. Rooted cuttings can be planted out with a fair degree of certainty of success and thus enable infilling when necessary with clonal plants of bushes already in the field. *Pruning.* Tea seed bushes pruned in summer some time before blooming increased the percentage of fruit set though the unpruned bushes bore the greater number of fruits. *Suncorch.* Two treatments were useful in preventing suncorch. 1. Shading each bush with thatch so that no sun could reach it resulted in a 68% reduction in scorch. 2. Whitewashing all branches exposed to the south and west sun resulted in a 65% reduction. Only the second treatment seems capable of large scale application. Placing pruned branches from medium prune back on top of the bush reduced incidence by 30%. Trees pruned to 20 inches from the ground in September and shaded by *Boga medeola* showed little scorch. Unshaded trees were severely scorched. The effect of time of pruning on suncorch incidence is demonstrated.

344. NEW ZEALAND, D.S.I.R.

634.1/7 + 664.85 + 633.71

Sixteenth Annual report of the Department of Scientific and Industrial Research N.Z. 1941-42, 1942, pp. 34, 1s.

Report of Plant Research Bureau. The Botany Division, Wellington, reports work on the utilization of seaweed for the production of agar, carrageen, potash, sodium, alginate and vitamins. Medicinal plants under trial include *Atropa belladonna*, *Datura stramonium*, *Hyoscyamus niger*, *Digitalis lanata*, *Papaver somniferum*.

Report of Fruit Research Committee. Long term manurial trials at Appleby and the Mildura blocks of the Cawthron show that the absence of N, P or K is attended by more or less serious results in the apple orchards on Moutere loam, especially in the case of nitrogen. Where magnesium deficiency has been established by the Cawthron Institute magnesium carbonate at 2 lb. per tree has proved the best

corrective. The concentration of magnesium in the leaves in cases of mg. deficiency is being studied. Apple rootstock trials are being continued in the hope of finding a stock superior to Northern Spy in resistance to root trouble in heavy wet soils. In varietal trials 15 strains of Delicious and 9 of Cox are maintaining their distinctive characters. The Cawthron has received from the U.S.A. a consignment of woolly aphid parasites. These are now being tested. Tests of rootstocks for lemon and sweet orange have now reached the stage when a considerable number of stocks are to be planted on the permanent trial areas. The Peruvian melon (*Solanum muricatum*) and several varieties of Japanese persimmon are being tested by the Plant Diseases Division. *Fruit Cold Storage Research Committee.* Jonathan, Sturmer and Granny Smith apples were submitted to definite atmospheres and temperatures in new gas-storage chambers, but as the result of leaks due to the impossibility of testing these chambers thoroughly beforehand only indications of the result of treatments can be given. Fertilizer treatments affected keeping quality, differing in effects with different varieties. It was noted that in cold stored Jonathans and Sturmers losses from attack by fungi were much less in bordeaux sprayed than in lime-sulphur sprayed fruit. Wax-lined papers inside the packing boxes greatly reduced wilt incidence in cold stored Winter Cole pears and proved economic. As regards orchard storage of apples experience continues to emphasize the advantages of a store giving a low fruit temperature. Oil wraps round Granny Smith apples in orchard stores reduced ripe spot and gave appreciable control of superficial scald. The use of waxed-paper case-liners for orchard stored Sturmers is not recommended. *Tobacco Research Committee.* Reports are presented of work at the Research Station, Riwaka, and at the Cawthron Institute.

345. PENNSYLVANIA. 634 + 635
Science for the farmer.
55th Annual Report Pennsylvania Agricultural Experiment Station 1941-42, 1942, pp. 44, being Bull. 429.

Notes of horticultural work in progress concern the following among other subjects:—Ladino-clover and other cover crops for orchards; wartime use of nitrogen; sprays for several pests; the danger of ethylene dichloride on wet soils; grape berry moth; apple bruising; prevention of pythium damping off of seedlings by soil drying; starter solutions for tomatoes.

346. WEST VIRGINIA (ORTON, C. R.) 633/635
Epistle to the farm.
Report of the Director West Virginia Agricultural Experiment Station for the Biennium 1938 to 1940, 1940, pp. 40, being Bull. 298.

A breezy account in the form of short notes of the salient features or results of the many different projects of the W. Virginia Station. A list is included of published articles on specific subjects. Among those noted are:—Cultural treatment for small fruits, blueberry selection, rootstocks, spraying with sodium thiocyanate to increase colour, potato manuring, tomato cultivation, waxing cabbage at transplanting, hardening of vegetables, the predaciousness of ants as regards codling moth larvae.

347.

The following publications have also been examined:—

Rep. Dir. Agric. Brit. Guiana for 1941, 1942, pp. 14.

A.R. Dir. Agric. Cyprus for 1941, 1942, pp. 4, 3 piastres.

11th A.R. Minist. Agric. Éire 1941-42, 1942, pp. 168 + [78], 3s. 6d.

A.R. Dep. Agric. Nyasaland Protectorate 1941, 1942, pp. 23, 2s. 6d.

A.R. Dep. Agric. St. Vincent for 1941, 1942, pp. 10. [Contains summary of Fennah's report on citrus pests of St. Vincent.]

14th A.R. Texas agric. Exp. Stat. 1941, 1942, pp. 202.

Administ. Rep. Dir. Agric. Trinidad & Tobago for 1941, 1942, being Coun. Pap. 31 of 1942, pp. 14, 12 cents.

U.S. DEPARTMENT OF AGRICULTURE.

Keeping livestock healthy. Yearbook of Agriculture 1942.

Supt. Documents, Washington, D.C., 1942, pp. 1276, \$1.75.

